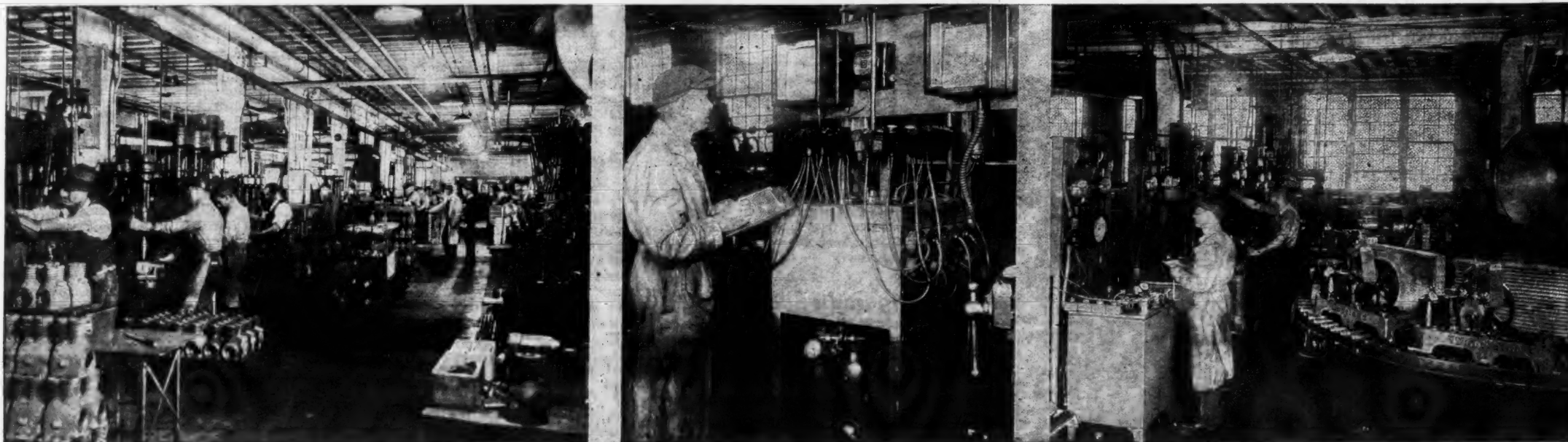


Copeland Plant Busy Making and Assembling Household and Commercial Units



(1) View showing straight line production in machine shop of Copeland factory. The men are working on crankcases, precision workmanship maintaining tolerances within .0002 inch. (2) Automatic testing apparatus used in checking temperature controls on Copeland household refrigerators. The specified temperatures are set in this machine, and the performance of each control is recorded both for cut-out and cut-in temperatures. (3) After leaving the drying ovens, the units are separated, with commercial units taking the left conveyor and household units the right conveyor, to be charged with refrigerant and oil. The men are checking capacity of the units on electrical calorimeters. Each unit undergoes a complete refrigeration test.



(1) Compressor unit assembly line, showing workmen assembling a group of large-size air-cooled commercial condensing units. The conveyor system shown here terminates in the shipping department. (2) Cabinet final inspection line. After machines and evaporators have been installed and operated for several hours, each refrigerator is thoroughly inspected and checked. Shelves are then installed, final inspection made for defective parts, cabinets cleaned, and then the entire refrigerator is crated for shipment. (3) Here the assembled units are being removed from the electric ovens, where they have been completely dehydrated at 240° F. under 29 inches of vacuum. This also constitutes a thorough check for leaks.

White & Co. Organizes Crosley Department

BOSTON—The R. H. White Co. here has been appointed dealer for Crosley electric refrigerators by the George Collins Co., Crosley distributor.

Crosley Shelvadors will be featured in a department operated separately from other refrigerator lines. "Tiny" Thompson is department manager.

Science Classes See How Grunow Operates

FALLON, Nev.—Donald Gott, representing Frank Woodliff & Son, Grunow dealer here, recently gave a demonstration to science classes at the high school to show how refrigerating units work. The unit, with moving parts visible, demonstrated the operation of the refrigeration cycle.

Utility Seeks to Up Minimum Bills in 'Liftop' Campaign

LINCOLN, Neb.—The Iowa-Nebraska Light & Power Co. here is using the General Electric "Liftop" refrigerator in its campaign to build load in the minimum-bill consumer segment, says Stanley Taber, merchandise manager for the company.

"Our minimum-bill and many of our below average customers," he said, "still think of electric service in the terms of electric light only. Despite the campaigns which have been conducted in the past, too often these customers think all they can afford is a little light in the evening hours or possibly an electric iron or washing machine."

"Because of this situation, we handle hundreds of accounts each month with a gross return of less than \$1.50 . . . During the summer months, approximately 40 per cent of the company's customers are in the minimum-bill class. These customers are in the lower-income groups."

Attractive terms—\$2.50 down and \$3.00 per month—have been arranged. To aid in sales, the company is allowing a one-week trial offer, but no sales supervisor or salesman is to have over two refrigerators out on trial at any one time.

"The savings story," Taber says, "is most important in selling to the below-average customer. It will be found true, in many cases, that the average cost for ice during the summer months will pay for the current consumed and the payment."

The General Electric Co. has prepared a series of direct mail advertising to be sent out at intervals to a selected list of prospects. Properties of the company are requested to include no one on the list who should own a larger refrigerator and to remove names as soon as a follow-up proves of no value.

By means of the direct-by-mail plan and a proper coverage plan in the districts, Mr. Taber hopes to add a minimum of two Liftops per town for the year.

"The utility has 205 electric retail towns," he stated, "and if each sales supervisor holds his average, more than 400 Liftops will have been added this year."

'Spot' Broadcasts Used By Parks & Hull

BALTIMORE—Sixty weekly "spot" broadcasts are being made over a Baltimore station by Parks & Hull Appliance Corp., Westinghouse distributor.

The number of "spots" each day follows: 10 on Mondays, Tuesdays, and Thursdays, 11 Wednesdays, 8 Fridays, 7 Saturdays, and 4 on Sundays.

Vacuum Cleaner Sales Gain During May

CLEVELAND—Sales of vacuum cleaners as reported by the Vacuum Cleaner Manufacturers Association for May were considerably higher than in May of 1934. Floor cleaners sold totaled 73,086 as compared with 65,213 in May of last year, while 27,321 hand cleaners were sold in May, 1935.



WISDOM



It is true wisdom to use preferred sources of supply on so important an item as refrigeration fittings. So much depends upon their faultless performance that it is folly to use fittings about which there may be any question.



Ever since the refrigeration industry came into being, Commonwealth Brass Corporation has supplied its leaders with Seepage-Proof Fittings, especially designed for the specific purposes of automatic refrigeration.



Beginning with the metal itself, continuing through design, manufacture, testing and shipping, every safeguard is thrown around the production of Commonwealth fittings.



Back of the manufacture of these little pieces of fabricated brass is the experience of an organization which has grown up with the industry. Coupled with years of experience are manufacturing facilities capable of producing millions of fittings, every one inspected 100%.



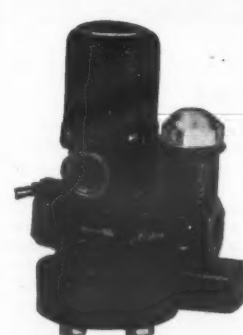
From our immense stocks of standard fittings we are able to make prompt shipments. We also carry hundreds of patterns of semi-standard types and make "specials" to blue-print, sample or sketch.

Make Commonwealth your source of supply for Seepage-Proof Fittings

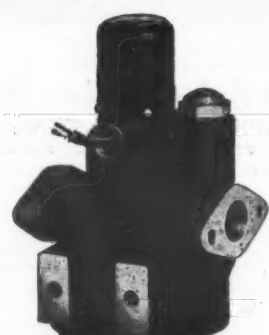
BUILT RIGHT TO STAY TIGHT

COMMONWEALTH BRASS CORPORATION

Commonwealth Ave. at G.T.R.R.
DETROIT, MICHIGAN



70-N 5/8"



70-N 1"



66 3/4"

Large Capacity Solenoid Valves

70-N 5/8" Capacity of 15 tons on Freon. 5/8" orifice, 1/2" or 3/4" pipe taps. Operates on the by-pass principle, therefore has low power consumption.

70-N 1" Capacity of 40 tons on Freon. 1" orifice, 1" or 1 1/4" O.D. tubing flanges. A large husky smooth operating refrigerant valve.

66 3/4" A water valve which will pass 1,500 gallons of water per hour. All brass construction. Has a diaphragm and works on the by-pass principle. Low power consumption.

These are the leaders of the large capacity solenoid valves. Smaller valves are also available. Learn more about these dependable low priced units. Write for catalog.

AUTOMATIC PRODUCTS COMPANY
121 N. Broadway Milwaukee, Wis.

REFRIGERATION NEWS

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Hartford Group Adopts Finance Plan Like TVA

Dealers, Utility & C.I.T. to Cooperate in Offering Lower Rates

HARTFORD, Conn.—Time-payment terms comparable to those extended by the Tennessee Valley Authority are now being offered Connecticut prospective purchasers of household electric refrigerators, in accordance with a plan made public last week by the Electric Refrigeration Council of this city, an organization composed of dealers in this territory, and the Hartford Electric Light Co.

The new plan has been put into effect through the cooperation of the Hartford organization and the Commercial Investment Trust, Inc. (C.I.T.).

Under the plan, electric refrigerators can be bought on terms up to 30 months with a down payment of \$5, and monthly instalments as low as \$3.50.

During the months of July and August, special terms are offered purchasers of units under 6-cu. ft. capacity. These summer terms extend the period of payments over 48 months, with down payments as low as \$3 and monthly instalments at a minimum of \$2.10. Electric Home & Farm Authority (EH&FA) rates are applied on all transactions.

Other advantages claimed for the Hartford plan are that dealers will be relieved of the usual requirements of providing credit information on the purchases, and that the power company will make collections directly from the customers, simultaneously with the collection of the monthly electric bills.

Salesmen's Complaints End Sales by Agent Who Split Commissions with Churches

BIRMINGHAM, Ala.—Concerted action of retail refrigerator salesmen here led to the abolishment of agreements between a number of local dealers and an agent who advertised in the newspapers that he could sell any make of refrigerator and divide his commission with the church of the purchaser's choosing.

Local retail salesmen raised such a complaint over this slicing of commission that most dealers canceled their arrangement with the agent and the practice of linking up churches with refrigerator selling has been condemned by the Birmingham Electric Refrigeration Bureau.

Government Surveys in Selected Cities Indicate Refrigeration Market by Income Classes

WASHINGTON, D. C.—The relationship between income and the ownership of an electric refrigerator is clearly indicated in the first two of five government surveys, covering consumer use of a selected list of goods and services, just published by the Bureau of Foreign and Domestic Commerce of the Department of Commerce.

Indicated in the surveys is the refrigeration saturation by income classes, and the largest potential markets, by income groups, for refrigerators and other electrical appliances in the future.

The two published studies relate to Austin, Tex., and Portland, Me. In preparation are reports on three other cities: Fargo, N. D., Columbia, S. C., and Salt Lake City, Utah.

Covered in the surveys, besides refrigerators, are building materials, heating apparatus, fuel for heating, fuel for cooking, lighting facilities, installed bathing facilities, and automobiles.

The figures given for Austin are on the basis of a survey covering 1,697 families, 13.3 per cent of the 1930 census figure, which showed 12,767 families in the city.

More than three-fourths (76.8 per cent) of these families were white, 16 per cent were Negro, and 7 per cent were of other races, chiefly Mexican.

It is significant that nearly one-half, or 48.2 per cent, of the families studied had incomes of less than \$1,000 for the year. That this condition existed largely in Negro and

Jeffrey Is Domestic Advertising Mgr. For Kelvinator



WALTER JEFFREY

DETROIT—Walter Jeffrey has been promoted to the position of domestic advertising manager of Kelvinator Corp.

Mr. Jeffrey has been with Kelvinator for the past five years, since the first of this year as operations manager of the advertising and sales promotion department. Prior to Jan. 1, he had been contest manager for Kelvinator for two years.

Wilbur E. Saylor, who has been connected with the Kelvinator sales promotion department for some time, becomes operations manager.

Stewart-Warner Radio Convention July 28-30

CHICAGO—Stewart-Warner Corp.'s national convention for its radio distributors will be held at the Drake hotel here, July 28, 29, and 30.

The new Stewart-Warner "Ferrodyn," a chassis made especially for use with metal tube equipment, will be introduced at the convention.

G-E Air-Conditioning Dept. Moves to Bloomfield, N. J.

NEW YORK CITY—Offices of the air-conditioning department of the General Electric Co. have been moved from the G-E Building at 570 Lexington Ave. here, to the Bloomfield works of the company, at 5 Lawrence St., Bloomfield, N. J.

Distributors at Crosley Meeting See New Radios

Powel Crosley, Jr., Predicts Heavy Summer Sales Of Refrigerators

CINCINNATI—One hundred and fifty Crosley distributors from every trading center of the United States were shown the 1936 line of Crosley radios at the midsummer convention in studio A, WLW, here Friday and heard a report by Powell Crosley, Jr., president, Crosley Radio Corp., on the volume of Crosley electric refrigerators sold in 1935 and an indication of the business outlook for the remainder of the year.

In his address to the distributors Mr. Crosley said:

"Up to June 1 we shipped 52 per cent more electric refrigerators than in the same period of 1934.

"Stocks in the hands of our distributors are not large. Distributors bought intelligently, and we have no overproduction problem here at the factory.

"Because of the late arrival of warm weather, I feel that we have a very

(Concluded on Page 2, Column 5)

'Jud' Sayre to Aid Cunningham at RCA-Victor



J. S. SAYRE

CHICAGO—J. S. (Jud) Sayre, manager since September, 1933, of the household appliance division of Montgomery Ward & Co. here, has resigned his position to become assistant to President E. T. Cunningham of the RCA-Victor Division of RCA Mfg. Co., Camden, N. J.

In his new capacity, Mr. Sayre will have overall duties relative to the merchandising, distribution, and production of RCA-Victor products, and will have an office in New York City as well as in Camden.

At Ward's, he was in charge of the buying, merchandising, engineering, and designing of all the equipment which went through the household appliance division.

Before coming here, Mr. Sayre was for six years sales manager of Kelvinator Corp., Detroit, having been associated with that organization since July 1, 1925.

Commercial Distributors Increased by York

YORK, Pa.—Field selling organization of York Ice Machinery Corp. on commercial electric refrigeration has been increased by the appointment of 15 new distributors, and the establishment of special commercial divisions at the York branch sales offices, states C. A. Pearson, national commercial supervisor for the manufacturer.

"In New York, Chicago, Los Angeles, Houston, and other large metropolitan centers, York factory branch offices have set up commercial divisions," says Mr. Pearson, "sep-

(Concluded on Page 2, Column 5)

Clark Will Direct Advertising for Frigidaire



LEE A. CLARK

DAYTON—Lee A. Clark, sales promotion manager of Frigidaire Corp., has been appointed advertising manager, succeeding Earl D. Doty, who resigned last week.

Mr. Clark has been with Frigidaire Corp. for the past six years, being appointed sales promotion manager in 1933, after having been assistant manager of the sales planning division for two years.

Before coming to Dayton, he was general sales manager of the Ft. Wayne Engineering & Mfg. Co., and had also been with the Wayne Co., pump manufacturer.

Grunow Radio to Be Shown July 26-27

CHICAGO—Grunow distributors, dealers, and their sales and service men will see the 1935-36 line of all-wave radios for the first time at the third annual Grunow Radio Convention, to be held in the Edgewater Beach Hotel here July 26 and 27.

All convention sessions, including the annual banquet, will be informal.

Rockwell Joins Staff of Universal Cooler

DETROIT—Appointment of W. D. Rockwell to a position in the commercial sales department of Universal Cooler Corp. was announced last week by T. S. Pendergast, commercial sales manager.

Mr. Rockwell has several years of field experience in the sale of commercial refrigeration equipment for all types of applications.

More 'Tested' Merchandising Ideas Presented in This Week's News

Again last week as every week a bevy of news stories telling about some distributor's or dealer's new selling idea or sales promotion stunt crossed the desks of the ELECTRIC REFRIGERATION NEWS editorial staff.

Presented herewith is a list of references to these "merchandising ideas" stories which were selected for publication in this issue. These articles deal not only with plans for retailing household refrigerators, but also present ideas for selling commercial and air-conditioning equipment.

"Hartford Group Adopts Finance Plan Like TVA," page 1.

"Government's Surveys in Selected Cities Indicate Refrigeration Market by Income Classes," page 1.

"Spring Parties, Cooking Schools, and Survey of Ice Users Build Prospect List," page 4.

"Phoenix Utility Acts as Agent for Dealers by Taking Refrigerator Orders for Them," page 4.

"Radio Broadcaster That Works Is New Crosley Sales Help," page 4.

"Edwina Nolan Directs School Which Grocers Association and Utility Sponsor in Fall River," page 13.

Sales Keep Pace With '34, Local Reports Indicate

Both Distributor to Dealer & Retail Sales Figures Compare Favorably

Further reports from local cooperative groups of sales made in their territories thus far this year show, for the groups reporting, a volume at least comparable to that of last year and in some cases, a higher total.

First of these reports from local associations or other agencies getting reports directly from dealers and distributors was printed in the July 10 issue of ELECTRIC REFRIGERATION NEWS.

Possibly the high spot in the reports garnered last week was the refrigeration business done by San Diego, Calif., dealers and distributors, an intensive cooperative campaign boosting sales 40 per cent for the first six months over last year.

Sales reported to the Utility Management Corp. which has operating power properties throughout the East and South showed a considerable increase. Of special interest is the fact that sales reported in June were nearly double those reported in June last year.

The reports from Cleveland and from the Northern New Jersey refrigeration distributors present a different angle as they are sales by distributors to dealers. In both cases, sales are about the same as those made for similar periods last year, with Cleveland sales slightly behind, and Northern New Jersey showing somewhat of an increase.

San Diego—2,615

San Diego dealers sold an estimated total of 2,625 household electric refrigerators in the first six months of 1935, as compared with a total of 1,912 units for the same period of last year, states J. Clark Chamberlain, secretary-manager of the San Diego Refrigeration Bureau.

The total for the first half of this year is an "estimated" figure, Mr. Chamberlain points out, because all figures for the month of June are not yet in. However, the total through May was 1,825 units, and Mr. Cham-

(Concluded on Page 4, Column 1)

First Bancredit Finances Stewart-Warner Sales

CHICAGO—Stewart-Warner Corp. has entered into a contract with the First Bancredit Corp. of St. Paul, whereby the First Bancredit Corp. will handle the financing of sales of Stewart-Warner refrigerators through dealers and distributors.

The First Bancredit Corp. plan of financing, which makes use of the Federal Housing Administration Act and amendments to the act, was described in the July 3 issue of ELECTRIC REFRIGERATION NEWS.

"Dealer Auctions One Unit to Promote Prospects," page 4.

"Milwaukee Distributor Heralds New Product with Real Parade," page 4.

"Amateur Programs Build Sales Coach Audience," page 4.

"Sales Idea of the Week," page 8.

"Dealers Cooperate in Contest Featuring Unit Features," page 8.

"Fernald Tells Why Hotels Present Big Market for Cooling," page 9.

"Erskine-Healy Urges Use of Recipe Books by Dealers," page 13.

"Leonard Dealer Conducts 'Airways Contests,'" page 15.

"FHA Urges Air-Conditioning Salesmen to Study Its Financing Possibilities," page 7.

"Birmingham Utility Sells 981 Lifts in 6 Months," page 2.

Also in this issue is the first of a series of articles by Editor George Taubeneck on the development of specialty selling methods by John H. Patterson, the genius of the National Cash Register Co. and accredited father of specialty selling methods, who probably gave the business world more new ideas on specialty merchandising than any other man.

U.S. Surveys in 2 Cities Show Market For Refrigerators by Income Groups

(Concluded from Page 1, Column 2)

Saturation is, naturally enough, highest among those families with incomes between \$5,000 and \$7,000. In this class, 63.9 per cent of the homes are equipped with mechanical refrigeration, but because of the relatively small number of families in this group (23 families were canvassed), it is superseded, numerically, by the \$3,000-\$5,000 class in which 133 families were studied, 69 of them reporting ownership of a refrigerator.

The second highest class, \$2,000-\$3,000, has 63 refrigerator owners in its ranks.

Ownership of an electric refrigerator is largely centered among the city's white residents. Of refrigeration-equipped homes, 94.9 per cent are occupied by white families, 61.9 per cent of them owners, and 33 per cent tenants. Slightly more than 66 per cent of all refrigerators reported in the survey were in homes which are occupied by their owners, all racial classes included.

Not quite one-tenth, 9.9 per cent, to be exact, of the total number of refrigerators in Austin are in the homes of families with yearly incomes of less than \$1,000.

It is interesting to find, however, that refrigeration-equipped homes are occupied by an average of 22.6 per cent of all families within the three income classes between \$1,000 and \$3,000.

Starting from the top income class and working down, the percentages on mechanical refrigeration ownership in Austin run all the way from 63.9 per cent, for the \$5,000-\$7,000 class, to 1.6 per cent, for the group whose income is between \$1 and \$500 per year.

Individually, the income classes run:

\$7,000 and over, 53.3 per cent, or 8 families out of 15 reporting they own a refrigerator; \$5,000 to \$7,000, 63.9 per cent, 23 families in 36; \$3,000 to \$5,000, 51.9 per cent ownership, 69 families in 133; \$2,000 to \$3,000, 33.2 per cent, 63 families in 190; \$1,500 to \$2,000, 22.4 per cent, 46 families in 205; \$1,000 to \$1,500, 12.3 per cent, 37 families in 300; \$500 to \$1,000, 3.6 per cent, 14 families in 394; \$1 to \$500, 1.6 per cent, 6 families in 379; and "no income" class, 15.6 per cent, 7 families in 45.

'No Income' Ownership

A curious feature of refrigeration ownership may be noted in the so-called "no income" group, which reported a higher percentage than any other one group below the \$1,500-\$2,000 class. This group is the only exception to the general tendency, which definitely relates income to ownership of an electric refrigerator.

This "no income" group apparently comprises families who differ widely from each other in the departure from normal circumstances, and likely contains families at both ends of the social scale. Reporting no income from salaries, commissions, fees, or investments, these families appear to be living either on savings which had been accumulated previously, and which they failed to report, or on borrowed funds or gifts.

Automobiles are owned by 57.3 per cent of all families reported in the survey, indicating the ownership of about four times as many automobiles as mechanical refrigerators. No statistics are given to indicate whether the cars are new or used.

Contrary to refrigeration, statistics

do not indicate a high influence of income on car ownership, the "no income" class reporting 44.5 per cent ownership. Relation between car ownership and income is more clearly shown, however, by the steady increase in the ratio of cars to families that is noticeable throughout the range of incomes, from the lowest to the highest.

Relationship between income and use of electricity, however, is strong and unmistakable. Families with incomes of less than \$1,000 constitute 95 per cent of all those whose homes do not have electric lighting facilities. On the other hand, practically all families with incomes of \$2,000 or over reported the use of electricity for lighting.

One Uses Electric Cooking

Only one family reported the use of electricity for cooking, of all the 1,697 families covered in the survey. This family, strangely enough, was not in the three higher income classes, as might normally be expected, but in the \$2,000 to \$3,000 class.

Contrasted with a percentage of 82.7, or 1,404 families, who use electricity for lighting, this would indicate an enormous potential field for electric ranges in particular, and for other electrical home appliances as well.

Comparison of income with percentage of ownership of mechanical refrigerators, automobiles, and use of electricity for lighting, is as follows:

Income Class	Percentage of Ownership		
	Refrigerator	Automobile	Electricity
No income	15.6	44.5	75.6
\$1-\$499	1.6	28.8	49.1
\$500-\$999	3.6	52.0	81.5
\$1,000-\$1,499	12.3	67.4	96.7
\$1,500-\$1,999	22.4	75.1	97.6
\$2,000-\$2,999	33.2	77.4	99.5
\$3,000-\$4,999	51.9	75.9	100.0
\$5,000-\$6,999	63.9	72.2	100.0
\$7,000 and over	53.3	53.3	100.0

Portland, Oregon

In Portland, the survey covered 3,097 families, or 17.7 per cent of the 1930 census figures of 17,478 families. All of the families studied were white, so the survey represented 17.8 per cent of this population.

Incomes under \$1,000 per year were reported by 34.7 per cent of the families, and 55.7 per cent had incomes which ranged between \$1,000 and \$3,000. The remaining 9.6 per cent were in the \$3,000 and up class. "No income" was reported by 2.2 per cent of the families, and only 1.2 per cent said their income had been \$7,000 or above.

Mechanical refrigerators are used by about one-half of those Portland families whose yearly income is \$3,000 or above, and by 16.8 per cent of all families in the city. A shade over 26 per cent (26.2) of the owner-occupant families, and only 12.1 per cent of the tenant families, have this type of equipment.

Own 74.2% of Refrigerators

The group with incomes between \$2,000 and \$3,000 per year, comprising 14.8 per cent of the total population studied, owned 22.4 per cent of all refrigerators reported in use in the city. Next, in point of number, was the group with an income between \$3,000 and \$5,000, which was using 18.4 per cent of the refrigerators reported.

In fact, the four groups whose incomes ranged between \$1,000 and \$5,000 yearly were reported as using 74.2 per cent of all refrigerators found in the survey. The group between \$1,500 and \$2,000, as in the case in Austin, came most near to the level of the city as a whole, its reported 16.9 per cent being just over the city's average, 16.8.

Higher Income—Higher Saturation

Only 14.8 per cent of the total number of refrigerators used in the city are in the homes of families that have incomes below \$1,000 per year. Over one-half (51.8 per cent) of the families in the city which have this equipment have yearly incomes which exceed \$2,000.

As would normally be expected, the highest income group, composed of families with incomes of \$7,000 or more, has a higher proportion of refrigeration-ownership than any other single group. The figure for this group is 77.8 per cent.

But, since only 36 families were canvassed in this group, it is surpassed, numerically, by the \$2,000 to \$3,000 class, in which 459 families were studied, 117 of them reporting ownership of an electric refrigerator.

Second highest, in number, is the \$3,000-\$5,000 class, with 96 users, and third is the \$1,500-\$2,000 class, with 88 users.

Study by Income Groups

Studied, in percentage of saturation, from the top income class to the bottom, the figures on refrigeration show a variation of from 77.8 per cent for the \$7,000 and over class, to 6.4 per cent, for the group with incomes between \$1 and \$500.

Individual figures are: \$7,000 and over, 77.8 per cent, or 28 owner-families in 36 studied; \$5,000 to \$7,000, 60.4 per cent, or 29 families in 48; \$3,000 to \$5,000, 44.7 per cent, or 96 families in 215; \$2,000 to \$3,000, 25.5 per cent, or 117 families in 459; \$1,500 to \$2,000, 16.5 per cent, or 88 families in 532; \$1,000 to \$1,500, 11.7 per cent, or 86 families in 733; \$500 to \$1,000, 7.6 per cent, or 48 families in 631; \$1 to \$500, 6.4 per cent, or 24 families in 374; "no income," 7.2 per cent, or 5 families in 69.

Automobiles are owned by a little more than two-fifths of all families in Portland, and less than 2 per cent of these families have more than one car. By this token, there are about three times as many automobiles as electric refrigerators in use in the city.

Passenger Car Studies

No clear relationship exists between tenancy and car ownership, since tenant families, 66.6 per cent of all families, constitute about 72 per cent of the families with no automobile. Of the more-than-one-car families, however, more than three-fourths own their own homes.

Most of the no-car families are in the low-income groups, slightly more than 50 per cent of them having incomes under \$1,000. But about one-fifth of the families with incomes under \$500 own a car—and approximately 25 per cent in the \$500-\$1,000 class report ownership. Highest number of cars is in the class with incomes between \$1,000 and \$1,500.

While relation between income and car ownership does not stand out from a study of any one group, it is indicated in the rise in ratio as the income class grows higher.

Use of electricity and income are closely allied. More than 95 per cent of homes in the city use electricity for lighting, and fully 86 per cent of those who do not use electricity are in the below \$1,000 income class. Conversely, practically all of the homes with incomes of \$2,000 or above use electricity for lighting. Greatest number of wired homes is, as is the case with automobiles, in the \$1,000-\$1,500 class.

Just 1.5 per cent of the city's families use electricity for cooking, while 75 per cent use gas. Largest number, 15, is in the \$2,000-\$3,000 class, and largest percentage, 4.2, in the \$3,000-\$5,000 class. Only one family in the \$7,000 or above class used this type of cooking equipment, indicating a large potential market in this field.

Comparative figures for the different income groups, as applies to ownership of refrigerators, automobiles, and the use of electricity, follows:

Income Class	Percentage of Ownership		
	Refrigerator	Automobile	Electricity
No income	7.2	18.8	94.2
\$1-\$499	6.4	18.7	94.1
\$500-\$999	7.6	23.6	98.4
\$1,000-\$1,499	11.7	61.4	99.6
\$1,500-\$1,999	16.5	50.0	99.6
\$2,000-\$2,999	25.5	63.8	99.8
\$3,000-\$4,999	44.7	70.7	100.0
\$5,000-\$6,999	60.4	68.7	100.0
\$7,000 and over	77.8	77.8	100.0

Crosley Distributors See New Radio Line

(Concluded from Page 1, Column 3)

wonderful opportunity to carry on with electric refrigerator sales as long as summer lasts. The refrigerator season will for this very reason no doubt continue longer than in other years."

Mr. Crosley then personally presented the new 1936 line of Crosley radios to the distributors. It embodies a number of changes and developments, most notable of which is the fact that all Crosley radios may be had with either glass or metal tubes.

Among the refinements is a new type of antenna which substantially lowers signal losses, reducing them to a new minimum and consequently providing greater signal strength and better reception. Tuning and selectivity have also been improved.

The 1936 Crosley line embodies radios from the completely contained portable types to deluxe models, as well as automobile radios. The factory production capacity for radios will be increased to 5,000 sets per day for 1936, Mr. Crosley said. The factory also has a production capacity of more than 2,000 electric refrigerators per day.

Commercial Distributors Appointed by York

(Concluded from Page 1, Column 3)

arate and distinct from the industrial refrigeration and air-conditioning divisions of the company. These are specializing in the sale of commercial and small air-conditioning systems."

Each of the branch commercial divisions is headed by a commercial supervisor who directs the sale of commercial equipment through branch commercial salesmen in the metropolitan territory, and assists a regional supervisor in contacting commercial distributors in cities which come under the jurisdiction of that branch.

The new commercial distributors include:

Pugh & Whitescarver, Inc., Roanoke, Va.; Tidewater-York Co., Norfolk, Va.; R. C. Beverly Heating Co., Richmond, Va.; Justus & Parker, Columbus, Ohio; N. S. Larsen Co., Toledo; Canton Hardware Co., Canton, Ohio; Oklahoma Refrigeration Co., Oklahoma City; Walter Conally Co., Tyler, Tex.; Young & Vann Supply Co., Birmingham, Ala.; Smith Elevator & Mfg. Co., Chattanooga; W. A. Owen, Johnson City, Tenn.; Electric Refrigeration Service, El Centro, Calif.; P. F. Pickett, Spokane, Wash.; H. N. Growder, Jr. Co., Allentown, Pa.; and Alex Orr, Miami, Fla.

Birmingham Utility Sells 981 Liftops in 6 Months

BIRMINGHAM, Ala.—The Birmingham Electric Co., up to July 1, had sold 981 Liftop General Electric refrigerators and has demonstrated 2,500. D. S. Richard, sales manager, reported at a recent meeting of the Birmingham Electric Refrigeration Bureau.

Ninety per cent of the demonstrations have been in homes where less than 30 kwhs. of current are consumed per month.

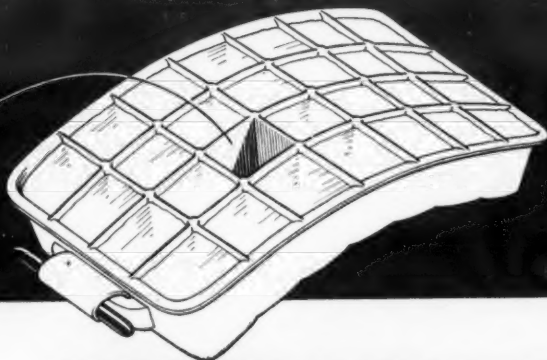
Mr. Richard said that the utility was beginning to get reverts where customers had bought bigger boxes. The Liftops are sold on very liberal terms, perhaps less than the monthly ice bill. No allowance is made for ice boxes.

The general opinion among dealers is that the sale of Liftops is helping the business for larger size boxes. Customers once using the Liftop are not satisfied to go back to ice boxes.

Copeland Refrigerator to Be Used in Lighthouse

DETROIT—First of a number of Copeland refrigerators for use in Great Lakes lighthouses was shipped last week, reports W. G. von Meyer, Copeland sales manager.

A TRAY FULL OF TRICKS!



"COLD FACTS" No. 8

When "hot" prospects begin to "cool off," Flexible Rubber Trays and Grids help reheat the buying urge...INSIST that ALL models of the refrigerator you sell come factory equipped. Write to your manufacturer or direct to us. The Inland Manufacturing Co., Dayton, Ohio.



Salesman: "See? The ice cubes pop right out!"

Prospect: "Oh dear! This refrigerator has everything! I'll just have to buy it. And be sure I get two of those Flexible Rubber Trays."

Flexible Rubber Trays and Grids
WILL HELP SELL
A MILLION AND A HALF REFRIGERATORS
IN 1935!

NOW A TREMENDOUS VALUE

in a beautiful NEW GRUNOW

—with safe, more efficient CARRENE

**Over
5 ft. net
capacity**

★ ★ ★

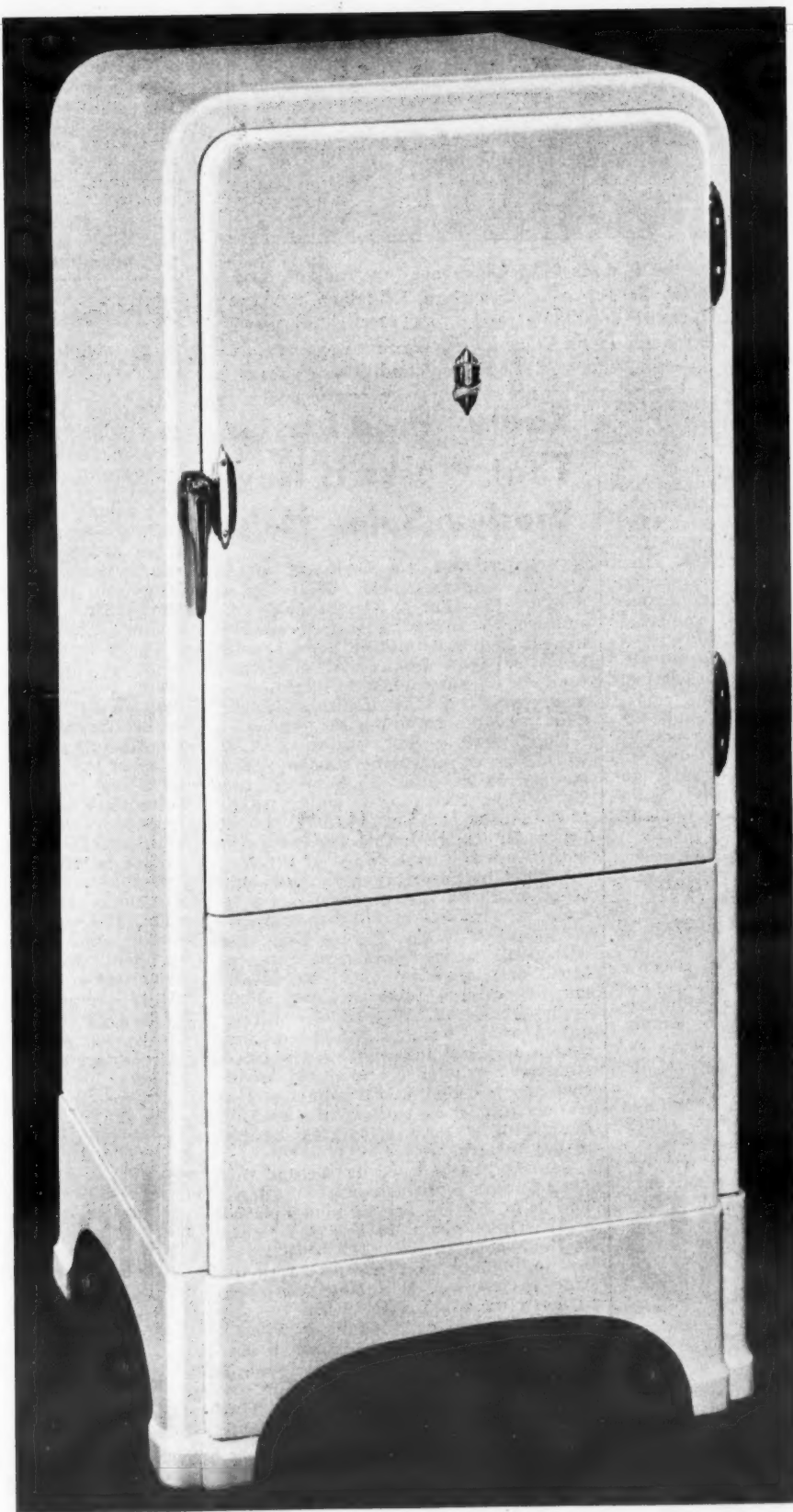
**Equipped
with
porcelain
vegetable
crisper,
fruit basket
and
egg rack**

★ ★ ★

**3 large
ice trays**

★ ★ ★

**128 cubes
and
many other
features**



GRUNOW MODEL 52-D

\$125⁰⁰

**f.o.b.
Chicago**

★ ★ ★

**truly a
sensational
buy for
any family**

**—and improved efficiency
that only CARRENE can give**

Phone or wire your distributor today

GENERAL HOUSEHOLD UTILITIES CO., 2650 North Crawford Ave., CHICAGO

Local Sales Keep Up With 1934 Record

(Concluded from Page 1, Column 5)
berlain has enough dealer reports in for June to state with assurance that an estimate of 800 units for June will come very close to the actual number of units sold.

If June sales do reach the 800 mark when final compilations are made, they will represent a considerable increase over the June, 1934, total of 350 units. May sales this year also showed an increase—750 as compared with 500 last May.

"Weather conditions have not accounted for the increase in sales this year," declares Mr. Chamberlain. "If anything, the mean temperature of the early summer has been below that of a year ago.

"Our Refrigeration Bureau," he says, "has undoubtedly been as great an influence as any in building sales. We have aggressively pounded in the newspapers, on billboards, over the radio, and through our Spring Show the need for this modern convenience, and have put great stress on the possibilities of the Housing Act in consumer purchasing.

"Right now we are putting on two 15-minute radio programs each week on refrigeration exclusively, and July 11 we opened a campaign to popularize the recent liberalizing of Housing Act requirements, whereby the renter may use this plan."

Utility Management Corp.

A. E. Ward of Utility Management Corp., which has operating companies in New York, New Jersey, Pennsylvania, and many parts of the South, says that total retail sales by company merchandising operations and by dealers in the territories where the operating companies supply power, was 35,447 units for the six months ended June 30, as compared with 22,447 sales reported for the first six months of 1934.

According to Mr. Ward, retail sales during the 30-day period ended June 30 were 19,590 units, as compared with 10,871 units for the corresponding period last year.

Northern New Jersey

Northern New Jersey refrigeration distributors report their sales monthly on anonymous cards by counties to the secretary of the Essex Electrical League who makes a combined report to all distributors, explains T. E. Babson, sales promotion manager for Philip H. Harrison & Co., General Electric distributor.

Sales of household refrigerators so reported show a total of 21,719 units for the first five months of 1935 against 15,172 for the similar period in 1934, an increase of 43 per cent.

"As these figures cover sales by distributors we are unable to say just what proportion has actually been sold to consumers," states Mr. Babson. "However, we believe that the percentage of increase would be the same.

"A small part of the increase," he continues, "may be accounted for by the fact that 11 distributors are re-

Old Style Chicken - - Modern Cooling



Ernie Henderson, who runs the famous "Chicken Shack" on Indiana Ave. in Chicago, finds this special Seeger cabinet with a Frigidaire system keeps the chickens in fine shape until he's ready to fry 'em "Southern style" for the patrons. That Ernie is sold on modern cooling is evidenced by the fact that he's investing in a \$12,000 air-conditioning plant.

porting sales in 1935 as compared with nine reporting last year."

Cleveland

Cleveland distributors of household electric refrigerators report sales to dealers on or about the 15th of each month for the previous month.

In the first five months of 1935 sales by distributors to dealers amounted to 11,890 refrigerators. This compares with a 1934 total for the same period of 12,180 units, which, however, is inaccurate, according to Ralph H. Jones, secretary of the Electrical League of Cleveland.

"The figure for 1934 is not accurate," says Mr. Jones, "because at that time we were endeavoring to secure the information too early in the month, and consequently found that the figures given were chiefly guesses."

Two Stores Operated by New Crosley Dealer

BOSTON—New dealer for Crosley electric refrigerators is C. E. Osgood & Co., with stores in Boston and Roxbury, Mass., says David C. Rockman, general manager, George Collings Co., Crosley distributor here. The refrigerator department of the Boston store is in charge of Mr. Clifford. Manager of that department at the Roxbury store is Mr. Eaton.

Radio Broadcaster That Works Is New Crosley Sales Help

CINCINNATI—Newest and possibly most novel Crosley dealer sales-help is "Station WEE," the world's smallest broadcasting station—operating on four one-hundredths of a watt, less than the amount of electricity used by an automobile tail-light—now being used by Ohio Crosley dealers, and available to other dealers.

Tiny brother to Crosley's WLW, world's most powerful station, WEE is only 54 in. long, 22 in. deep, and 20 in. high. Its power is less than the 12-millionth part of WLW's 500,000 watts. Its range is 200 ft., compared with the world-wide range of WLW.

WEE's transmitting towers are but 24 in. high, its instrument panel 8 in. wide, and its weight 175 lbs., complete with equipment and towers, compared with WLW's 831-ft. vertical antenna, 54-ft. instrument panel, and 900,000 lbs. of antenna tower weight, alone.

Though small, WEE is not a toy, but a real station, with everything that a big broadcasting station has—studios, microphones, and all. It broadcasts both direct and from electrical transcriptions, on the regular channel from 550 to 1,500 kilocycles, or 200 to 600 meters.

Ten months of work are behind this Tom Thumb of broadcasting stations. The 24-in. towers are of nickel-plated brass. There are 1,024 soldered joints in their construction, 112 little steps in the ladders that ascend to them. Atop each tower is a tiny red light, to warn off night flyers.

In the miniature studio is a real single-button hand microphone, a six-inch replica of a full-length stand "mike," operated by throwing a switch on the speed input panel. The microphone input transformers and inductance coils were all hand wound.

Amateur Programs Build Sales Coach Audience

NORWICH, Conn.—A new use for the G-E sales pilot coach has been discovered by Earl G. Taggart, General Electric dealer for this territory.

Not satisfied with results obtained from his one-minute talks on appliances given through the amplifier recently installed in his pilot coach, Mr. Taggart hit upon the idea of conducting an amateur program from the coach.

Now, in all the small towns on his circuit, he announces: "Come on kids—if you sing, dance, recite, mimic, or do anything else that entertains, do it for your neighbors over the 'mike.'" This plan has resulted in mothers, brothers, and sisters coming to "listen in."

Dealer Auctions One Unit To Promote Prospects

WOOSTER, Ohio—Selling by auction was a novel promotion scheme for selling refrigerators recently devised by the William Annat Co., local Westinghouse dealer. When Annat put a BL-75 Westinghouse refrigerator on the auction block, 21 bids were received, and the unit sold for \$3.00 under the special price.

Spring Parties, Cooking Schools & Survey Of Ice Users Build Prospect List

ROSSELL, N. M.—Spring parties, cooking schools, and a check-up on ice users are three of the principal methods which Mable-Lowrey Hardware Co., Kelvinator dealer here, uses to build its prospect list and keep it ever alive.

Capitalizing on the new customers' pride of ownership, the firm last month held a party for Kelvinator users and their non-owner friends at their showrooms here.

Printed invitations complimented the users on their choice of Kelvinator, and asked them to bring as many of their friends as they cared to, to the party. A gift of \$5 was promised to each owner whose friend bought a refrigerator within 60 days.

Souvenirs, refreshments, entertainment, and a demonstration of the Kelvinator line were a part of the party program, which attracted wide interest.

Another method of securing prospects' names, tried by the company recently, was a check-up on ice users.

Two boys sat across the street from a cash and carry ice station for three days, and took down the numbers of the cars stopping for ice. Since ice is usually carried on the bumper or the running board, the information was easily obtained through observation.

From the check-sheets compiled, Mable-Lowrey knew that if a certain car appeared at the station on two

successive days, the owner used a certain amount of ice each day. If the car came on the first and third days, the owner was an "every other day" ice buyer.

The lists were then checked with the state automobile registration bureau, and the names and addresses of these ice buyers obtained. Names were divided according to sales territories.

In making follow-ups, Mable-Lowrey salesmen could tell the housewife exactly what her ice costs were. Because the source of the information was not disclosed, prospects were naturally curious, and an unusually large number of sales demonstrations was permitted.

Sales of more than \$1,000 in Kelvinator equipment, and the securing of hundreds of additional prospects followed a four-day cooking school conducted by the firm this spring in a local movie house. The school, conducted by Dorothy Covert, Kelvinator home economist, drew 750 women in a single morning.

Users play a big part in Mable-Lowrey's promotional plans. A large board, located in the refrigeration section, lists the names of all Kelvinator users in the city. Panels are added from year to year, as the list grows. The board attracts interest and eases sales, since every visitor to the department can find at least one of his acquaintance listed there.

Phoenix Utility Acts as Agent for Dealers By Taking Refrigerator Orders for Them

PHOENIX, Ariz.—Central Arizona Light and Power Co., after voluntarily stepping out of the refrigerator merchandising picture, is acting as an agent for local refrigerator dealers, and taking orders for them.

This plan has led to the sale of more refrigerators in Phoenix during the first four months of 1935, than were sold in the entire year of 1934, the utility's executives declare.

The plan operates as follows: Three leading brands of refrigerators are displayed on the floor. A crew of 10 outside salesmen employed by the utility, is constantly working on refrigeration, along with other merchandise.

When the salesman gets a prospect he brings the prospect to the company sales floor and demonstrates the refrigerators displayed. No favoritism is shown for any particular make. Choice is left entirely to the prospect.

If the patron chooses a refrigerator, she signs the contract at the utility's office. The contract is then sent to the dealer, who makes delivery. Charges, sufficient to cover the salesman's commission, are received by the utility company.

Central Arizona Light and Power Co. is also promoting air-conditioning in cooperation with distributors or jobbers.

Prospecting, selling, and in some cases, financing, are part of the power

company's work in putting the air-conditioning industry on a firm basis in Phoenix. The prospect sold on air conditioning is turned over to the distributor or dealer who handles the equipment desired. The dealer does the engineering, installation, and servicing.

Because the utility works the town extensively, handling several lines of products, dealers receive more benefit from this arrangement, than if they depended solely on their company salesmen.

Milwaukee Distributor Heralds New Product With Real Parade

MILWAUKEE—Because most people "love a parade," this idea was used in the latest sales stunt staged by the General Electric Supply Corp. of this city July 8.

With trumpets from the G-E band attracting the attention of all the luncheon-going citizens, six decorated horses led by a lady-page, marched down Wisconsin Ave., to the Astor hotel where a G-E dealers' meeting was held.

Backs of the horses had placards picturing exaggerated replicas of the new G-E metal radio tubes.

Deliver a COPELAND



AND You've Delivered THE GOODS!

COPELAND does its best work building goodwill for you when you place it in operation in the customer's home. So efficient is the remarkable Copeland unit that each enthusiastic owner takes pride in telling her neighbors how perfectly her new Copeland performs. Behind the outstanding performance of every Copeland is the experience of 18 years devoted exclusively to the design and manufacture of electric refrigeration. When you deliver a Copeland—you always deliver the goods.

A few distributor's franchises are available. Write today!

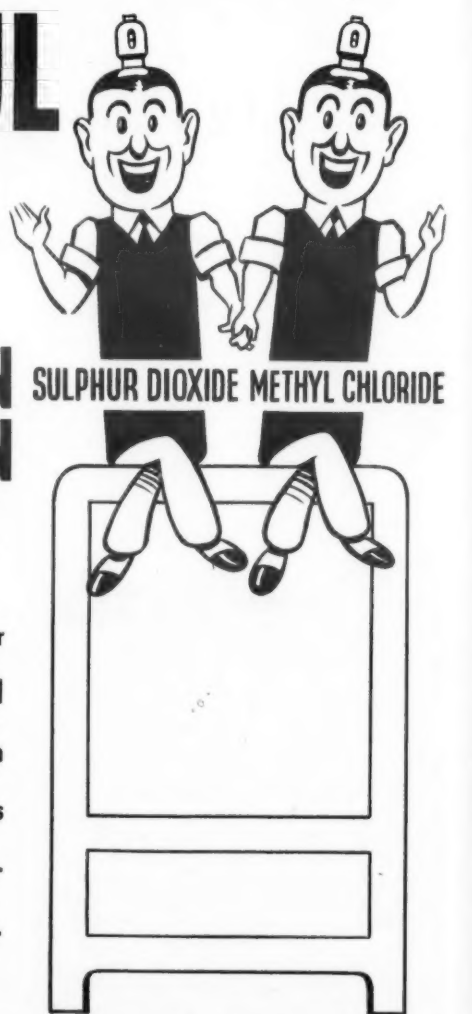
COPELAND REFRIGERATION CORPORATION

Manufacturers of a Complete Line of Household and Commercial Refrigeration
Holden Ave. at Lincoln . . . DETROIT, MICH.

Copeland
DEPENDABLE Electric REFRIGERATION

The ANSUL Twins MAKE REFRIGERATION SATISFACTION Certain

You will find Ansul Sulphur Dioxide and Ansul Methyl Chloride perfect for refrigeration purposes. The individual analysis of every cylinder is your guarantee of highest quality at all times.



ANSUL CHEMICAL COMPANY
MARINETTE WISCONSIN

All Appliance Lines Show Sales Increase, Agent-Jobbers Claim

HOT SPRINGS, Va.—That sales volume on electrical appliances has increased in practically all lines over that of last year was the consensus of opinion at the twenty-third annual meeting of the Westinghouse Agent-Jobbers Association held here recently.

Lowered power rates are stimulating use of current and purchases of heavy equipment and industrial supplies, it was stated. A comment typical of the group outlook for household appliances was:

"Education for women to let electric servants do their work in the home is bearing fruit with the improvement in purchasing power and willingness to buy.

"Laundry equipment is ahead of last year in sales. Electric cooking is fast moving to its rightful position, aided by reduced power rates in many centers and by special rates to encourage electrical cooking and water heating.

"Refrigeration sales, both domestic and commercial, show decided increases in practically all markets. Small appliances also share in the general increase."

The following officers and members of the executive committee were elected:

President, Claude W. Johnson, Johnson Electric Supply Co., Cincinnati; vice president, A. E. Allen, Westinghouse Electric & Mfg. Co., Mansfield, Ohio; vice president, N. G. Symonds, Westinghouse Electric & Mfg. Co., East Pittsburgh; secretary, H. M. Moock, Moock Electric Supply Co., Canton, Ohio; assistant secretary and treasurer, H. T. Pritchard, Westinghouse Electric & Mfg. Co., Mansfield, Ohio.

Members of the executive committee are: Karr Parket, McCarthy Bros. & Ford, Buffalo; W. I. Bickford, Iron City Electric Co., Pittsburgh; B. W. Clark, Westinghouse Electric Supply Co., New York City; J. C. Schmidt-bauer, Westinghouse Electric Supply Co., Chicago; J. S. Shaw, Moore-Handley Hardware Co., Birmingham, Ala.

D. S. Youngholm, Westinghouse Lamp Co., New York City; R. E. Imhoff, Westinghouse Electric & Mfg. Co., Mansfield, Ohio; R. A. Neal, Westinghouse Electric & Mfg. Co., East Pittsburgh; F. T. Whiting, Westinghouse Electric & Mfg. Co., Chicago; and E. W. Loomis, Westinghouse Electric & Mfg. Co., Philadelphia.

Philadelphia Electrical Show Oct. 7-12

PHILADELPHIA—Eighth annual Philadelphia electrical show will be held at convention hall here October 7 to 12, reports George R. Conover, managing director of the Philadelphia Electrical Association.

"In catering to the public's desire to see and compare the latest models in radios, ranges, refrigerators, air conditioners, and electrical appliances, and to keep abreast of scientific and laboratory developments, all branches of the electrical industry including nationally known manufacturers, distributors, and dealers, will participate and occupy display booths," says Mr. Conover.

France Requires Import Licenses on Refrigerators

WASHINGTON, D. C.—Individual import licenses are required for importation into France of domestic electric refrigerators, refrigeration apparatus, cream separators, and similar centrifugal apparatus by decrees published in the French Journal Official of May 17, 1935, according to cabled advices to the Commerce Department from its commercial attache at Paris.

Licenses will be limited to the quantities that importers can show they imported during the corresponding month of 1934, the cable states. Shipments made directly to France before May 17 will be admitted freely.

Bridge to Direct Sales Of Norge Washers

DETROIT—E. R. Bridge, until recently a sales executive with the Maytag Co. of Newton, Iowa, has been named washer sales manager of Norge Corp., announces John H. Knapp, Norge vice president in charge of sales.

Mr. Bridge will make his headquarters in Detroit, and will manage sales of Norge's Autoblitz washer during the summer campaign which Norge is making on refrigerators, ranges, and washers during July and August.

Norge washer sales for the first quarter of 1935 exceeded those for the whole of 1934, Mr. Knapp announced.

DEPENDABLE where lives are at stake because "non-hygroscopic"

Sort of a tough word, that "non-hygroscopic." But it is a thing that frequently stands between life and death at sea. It is the quality of resisting moisture absorption. The materials used in life preservers possess this quality to a considerable degree and keep them afloat with their precious burdens for a long time.

But the insulation of a refrigerator must be 100% "non-hygroscopic" if the refrigerator is to remain efficient and economical to run, because the insulation must resist moisture absorption over a period of years rather than days. Water vapor (humidity) irresistibly forces its way into the walls of a refrigerator, because of the difference in temperature between the warm outer shell and the cold inner wall. Although a well-built steel refrigerator greatly reduces this moisture entry, it cannot be eliminated. In a poorly built refrigerator, amazing amounts of water condense inside the walls from this vapor entry.

If the insulation is "non-hygroscopic"—that is, if it resists water like a duck's back, long and economical refrigeration service is assured the well-made refrigerator. And much better service will be given by a poorly built job. But "hygroscopic" materials, such as the cheap insulants, are absorbent and become damp. And damp materials, of whatever nature, will not insulate. They ruin the efficiency of your refrigerator in a short time by placing too much burden on the unit. This results in high current cost, poor refrigeration and eventual breakdown.

Scientific research discovered in the Dry-Zero fibre a commercially practical "non-hygroscopic" material of the highest insulating value when properly processed. If you would be sure your customers will never have any cause for dissatisfaction from insulation failure, insist on Dry-Zero Insulation in the boxes you sell. If you are selling Dry-Zero insulated refrigerators, be sure to tell your prospects why this better and more expensive insulation will save them from 30 cents a month when new to as much as \$2.50 later, in cost of electricity. Dry-Zero Insulation will give them efficient heat-stopping protection for the entire life of the refrigerator.

Dry-Zero Corporation, Merchandise Mart, Chicago, Ill.
Canadian Office, 687 Broadview Ave., Toronto, Ontario.

DRY-ZERO
REG. U.S. PAT. OFF.
THE MOST EFFICIENT
COMMERCIAL INSULANT KNOWN



PERSONALITIES

By George F. Taubeneck

John H. Patterson

John H. Patterson was the man who, as president of Dayton, Ohio's National Cash Register Co. from 1885 to 1922, introduced so many ideas which are now looked upon as the foundation and the structure of successful specialty selling that he has often been called "the daddy of modern sales management." That, gentlemen, is a long and involved sentence; but so was John Patterson's life.

Unravelling the varicolored skeins of that life from their patchwork design, and reweaving them into a pattern easy and pleasing to look upon, is no cinch of a job. That's why this story was reorganized and rewritten—from the first capital letter to the last period—no less than five times in four years.

Trying to make sense out of John Patterson's life is like trying to fit together the scrambled pieces of three jig-saw puzzles. Had one the patience of Griselda and the age of Methuselah—with a dash of Galahad's luck, one might turn the trick.

But even then, what would you have? Three completed jig-saw puzzles. Which, to the recorder, would be three biographies; not one. Nor would any of the biographies be John Patterson.

Triple-Personality Men

Every man is said to be a potential Dr. Jekyll-Mr. Hyde. Each of us has, to some degree, a dual personality. Conflict arises when the recessant personality tries of being a violet, and rises up to smite the dominant personality on the noggin. And then Mr. Average Man does something he has a hard time explaining later to his wife or to the clammy-eyed office manager. Generally, however, Mr. Dual Personality (just call me "Average") Man strikes up a balance within himself and becomes someone you can put a finger on and identify.

Once in a thousand spawnings, though, Nature gets bored with its line production dual-personality jobs, and turns out a triple—or, if she's feeling exceptionally nasty and cantankerous and vindictive, a quadruple-personality.

These triple-personality babies are what the Viennese psychologists call "schizoids." Because they can never achieve a balance, they fight with everybody else as well as with themselves; and in so doing they change and move a lot of things around that have long needed changing and moving.

There's something about a three-way tussle that makes for a constant unrest. Put a man and a woman together in holy matrimony, and you have conflict; but soon they settle into the armed truce which is marriage, and achieve a measure of balance. Add another man, or another woman, and you have—unless you're a character in Noel Coward's "Design for Living"—the troublesome old eternal triangle, which can't be balanced.

Your quadruple-personality man (we bet all this exposition will surprise bona fide psychologists no end—but anyway, it's fun writing it) generally becomes a psychopathic case. Like a battle royal, his personal conflict usually ends with all four contending elements on the floor.

Mr. Triple Personality, it must be admitted, frequently accomplishes something of revolutionary importance within his period of man's history. Like John Patterson (we'd practically forgotten about John—hope you haven't), his perpetual conflict within himself causes him to be satisfied with nothing, to upturn stones just for the sake of upturning them.

Every once-in-a-while one of those up-turned stones turns out to be a nugget. Mr. Triple Personality rarely accumulates many of these nuggets himself; he's too busy uprooting new ones. But the sum total of random-prospected wealth frequently enriches the world-at-large vastly.

Tough on Associates

So it was with John Patterson. Like all schizoids, he created merry hell amongst his associates. Just when a new sales manager was getting adjusted to Personality No. 1, Patterson would become Personality No. 2. His associates never knew where they were, or why. Orders given one day were rescinded the next; and a week later the poor water-carriers would be roundly and picturesquely berated for not carrying out the original orders.

But out of the bewildering variety of their lives there emerged Specialty Salesmanship.

We're a long way off from John

Patterson and the three scrambled jig-saw puzzles which form the record of his life, aren't we? Fact is, we're all wound up like a kitten in grandma's ball of yarn (who remembers 'way back when we had grandmothers, balls of yarn, and kittens all on the same bill?)

But that's how you get—all wound up, we mean—when you associate long with the oral, written, and rewritten, fabled, and occasionally fabulous data on John Patterson's life. If you don't believe us, c'mup sometime 'n see the data.

Anyway, what we set out to do four years ago when this never-to-be-processed-enough idea struck us, was show how John Patterson unconsciously—and in the perspiring, ruthless, violent, incoherent, inconsistent, painfully inarticulate, and altogether terrifying manner of the first-class schizoid—really invented Specialty Salesmanship.

This story, then, is the attempt to extract the pieces of jig-saw puzzle from the jumble of Patterson's life, and fit them into a picture. No doubt the image will somewhat resemble early attempts at television, but if you have a good imagination, maybe you can fill in the missing wrinkles and colors yourself.

A Definition of Specialty Salesmanship

What is Specialty Salesmanship? It is the core around which distribution today is molded. It is the complement of mass production as the symbol of the era in which we live. Some believe its manifestations were one of the major causes of The Worst Depression in All History; others aver just as firmly that more specialty salesmanship would have averted it.

When a merchant becomes a merchandiser, he has adopted the principles of specialty salesmanship. These principles resolve themselves into one easy premise: Sell the prospect something he didn't know he wanted.

Specialty Salesmanship's fundamental rule is: Put yourself in the shoes of your prospect. Find out what he needs most, and then demonstrate how your product will fill that need.

What are the mechanics of Specialty Salesmanship? Pray permit us to quote from the 1935 REFRIGERATION AND AIR CONDITIONING MARKET DATA BOOK (we wrote it, so you're not being gyped):

"Out of the accumulation of merchandising ideas which have been born in the heat of competitive struggle, the electric refrigeration industry has developed a sales procedure which very closely resembles a formula. This formula is used, with slight variations, by all of the manufacturers who have been leading the industry for the last few years.

"Viewed broadly, the formula seems comparatively simple. A strong desire for an electric refrigerator is created in the mind of the public by aggressive advertising and promotional efforts. Prospects are ferreted out by cold canvass and by special stunts such as drawings, essay contests, and theater program tie-ups. These prospects are made "hot" by newspaper and direct-mail advertising. And then carefully trained salesmen, who are taught exactly what to say and do at every turn, go directly to the homes of the prospects to get the orders. Salesmen on showroom floors skilled in another phase of selling technique, take care of the "walk-in" traffic which comes in response to advertising and promotional efforts.

"Viewed in detail, the formula becomes complex. Sales programs, consisting of quotas, contests (highly important and often elaborate), direct-mail campaigns, sales training courses, educational sidelines, sales helps, sales talks, and sales themes must be worked out for the distributing organizations. And then the programs must be sold to the dealers and distributors at national and district conventions and gatherings of various sorts. After which sales department representatives must see to it that the programs are followed religiously. Control is the key-word to the whole operation.

"The complete units of these manufacturers are sold through branch offices, independent distributors, jobbers, and dealers. Many of the distributing organizations maintain retail stores under their own control. A large share of the total sales is made by a relatively small number of distributors and dealers. Best results, in terms of volume, have been secured through closely-controlled distributor and dealer operations devoted exclusively to electric refrigeration. Department stores and public utilities have also sold electric refrigerators in great volume.

"The larger manufacturers have en-

couraged extensive distribution for display purposes and to secure every possible contact with the public; but several thousand of these dealers sell less than five units per year each.

"Operations of distributors and dealers are closely controlled and directed by home offices. Headquarters staffs may include a number of specialists who head up divisions such as dealer, distributor, public utility, household, commercial, air conditioning, apartment house, water cooler, beer cooler, ice cream cabinet, rural, sales planning, sales schools, service, home economics, new developments, and the like. Advertising and sales promotion departments are large and well-staffed. Carrying to the field the ideas evolved by these headquarters groups are regional and district representatives, who keep in close contact with distributors and dealers, and study their problems, and help them in many ways."

Was Patterson First?

Figuring that a knowledge of the genesis of specialty selling should be useful to both buyer and seller—and that includes just about everybody—we have considered herein the various facets of the specialty selling program, and tried to tell the story of the birth of each.

To insist that such items as direct-mail advertising, testimonial advertising, house organs, "using the user," guaranteed territories, sales conventions, the standard demonstration, the sales manual (or "canned sales talk"), the "pays-for-itself" economy argument, circuit riding, sales training schools, sales quotas, sales contests, enlisting the wives, charting ideas, and the employee's suggestion box, all were born in the prolific head of

Introduction

On this page is the first of a series of articles, written by the editor, on the Development of the Specialty Selling Formula by John H. Patterson, founder of the National Cash Register Co.

What manner of man was Patterson? This first instalment of the series attempts to answer, briefly, that question—on which two voluminous books have been written. These two books, "John H. Patterson," by Samuel Crowther, and "The Sales Strategy of John H. Patterson," by Roy W. Johnson and Russell W. Lynch (published by Dartnell), have been consulted for details on Patterson as an individual.

Subsequent issues will tell how such fundamental specialty selling ideas as guaranteed territories, sales quotas, direct mail prospect cultivation, standard sales presentations, sales manuals, sales contests, "using the user" plans, field supervision, testimonial advertising, enlisting the wives, and house organs came into being under the stimulation of Patterson's fertile mind.

The writer is especially indebted to G. A. Nichols, editor of *Printers' Ink*, for permission to reprint at considerable length from a number of articles written for that publication in 1910, 1911, and 1912 by E. D. Gibbs, onetime advertising manager of the National Cash Register Co.

Other source material includes two articles written by Patterson himself for *System* (June and July, 1918); "A Business Genius and How He Works," by F. C. Kelly, *American Magazine*, February, 1916; "Davison and Patterson—Farm Boys Who Rose," *Literary Digest*, May 27, 1922.

In the gathering of original material and anecdotes James W. Irwin, publicity director, "Mickey" Farrell, window display director, and Earl Doty, former advertising manager of Frigidaire Corp., have been of particular assistance. Elston D. Herron of the Owens-Illinois Glass Co. and Mrs. Berrien Ketcham contributed valuable aid during the library-research period of the preparation of the manuscript.

John Patterson will be tantamount to precipitating a hundred battles of correspondence.

Our apple-cheeked postman will doubtless be bowed hunch-backed by the avalanche of letters which will come in claiming the prior use of one or more of these ideas which we credit to John Patterson.

But what we say is that even if one of these ideas was used somewhere—by the Chinese, or the Arabs, or somebody—before Patterson was ever heard of, it was none the less born in Patterson's brain.

He did not—and his former associates will unite in substantiating this statement—knowingly copy anybody. His ideas were born in full armor, like Minerva from Jove's forehead; and the possibility that others may have thought of them also is coincidental.

The important thing is that Patterson bludgeoned all these ideas into a species of formula, made it pay, and taught that formula to dozens

of smart young men who later went out to evangelize America with this new gospel.

Perhaps no man of twentieth century America has had more influence on his times or the lives of his countrymen than John Patterson. That's a broad statement; but when you consider how much specialty salesmanship has affected our living standards—and when you discover how much Patterson had to do with the development of specialty salesmanship, perhaps the statement won't seem ill-advised.

Vital Statistics

First, we suppose, you'd like to know some of the vital statistics of John Patterson's life. Okay, we'll run through the biography quickly.

He was born in Dayton in 1844, and educated in the Dayton public schools. For two years he attended Miami (Ohio) University; but was graduated from Dartmouth College in 1867. From the time of his graduation until the spring of 1884, he and his brother, Frank Patterson, were in the retail coal business in Dayton.

In 1884, John Patterson's natural restlessness could be curbed no longer. He felt that the coal business offered no suitable outlet for his energies, so the brothers sold their firm, and went West to enter the livestock-raising business.

Just why the Patterson brothers did not stick to ranching and become cattle kings is not recorded. It is perhaps enough to know that they lost interest and returned to Ohio.

John H. had seen a cash register, the invention of one James Ditty, which had been manufactured at the small plant of the National Mfg. Co. in Dayton. But few at that time seemed interested in buying cash registers, and the company was in a tottering condition when the ex-ranchman returned to his home town and bought out the controlling interest. A cash register, in those days, was something of a "Goldberg" invention which nobody seemed to take seriously.

So cuttily and humilatingly was Patterson ridiculed by fellow Daytonians for this investment that the ex-coal dealer almost took his loss and gave up the business. But on a second trip west, he happened to talk with an enthusiastic cash register user, and came back home, determined to make the most of his supposed white elephant.

In 1885, he reorganized the feeble concern, gave it the name of National Cash Register Co., assumed the presidency, and began his long, business-history-making struggle to build up sales for cash registers.

He took time out in 1888 to get married; and later became the father of one son and one daughter. Mrs. Patterson died shortly after birth of the second child.

Few Outside Activities

Patterson's activities outside of his business were comparatively few. Perhaps that concentration of thought and effort is one good reason why his contributions to the improvement of business methods and practices have probably never been surpassed by any person or company in all business history. His mind was so active, his energies so magnificent, that concentration of these lavishly generated qualities was bound to result in something far-reaching in its consequences. It did.

Ideas he introduced for conduct of business and development of effective selling were remarkable not only for their number, but for their practicality. But his personal life and human relationships were marred by his ever-present restlessness and its attendant demons, irritability and autocracy.

It is notable that one of his favorite precepts was, "He who overcomes others is strong, but he who overcomes himself is mightier." Yet, not until later in life did he try to overcome his own temper and temperament.

Perhaps had he disciplined himself earlier in life he would not have been tormented by violent emotions in later years. He tried to establish self-control by avoiding unpleasant situations, rather than by controlling himself. This in spite of the fact that he otherwise showed all the earmarks of the born fighter. He was at his best when the foe swarmed thickest; but the one adversary he didn't choose to combat was John H. Patterson.

Possibly Patterson's greatest personal handicap lay in the fact that he played to the weaker side of human nature. Alvan Macauley, president of the Packard Motor Co., says of him: "Always he had before him the rule that men accomplished results for two reasons, and only two: namely, hope of reward and fear of punishment."

So strongly did he stress love of money in training and driving his employees—showing them by his own extravagance the luxury which would be theirs if they made more sales—

that his conception of human nature became somewhat distorted.

Little Family Life

Mrs. Patterson died within a few years after her marriage to John H., and he was too busy to take much part in rearing his two children. More family life, some of his former associates claim, might have softened some of Patterson's callousness, given him understanding of more than one side of human nature. It might, perhaps, have developed his entirely dormant sense of humor.

No man could be Patterson's friend for long. In all probability the personal side of the man's nature was as much misunderstood as was his business personality by his competitors. And people are wary of that which they don't understand.

Even so, it isn't likely that Patterson ever lamented the lack of close friends. His business was made to compensate for a great deal that he may have missed in his personal life. Although he did take a fling at an occasional "outside interest," none of his extra-business activities led him to make friends. And those "friends" within the business who had special favors heaped upon them knew they were on quaking ground.

For Patterson required much of his associates. He loathed yes-men, laid diabolical traps to catch them. He tolerated mistake makers, but could not endure men who were slow in making up their minds. Often he was blisteringly sarcastic, with eloquent laconicism.

He changed favorites often. A man singled out for promotion and distinction from Patterson did well to remember: "When the sun shines, look out for the adder." One tiny slip might mean an extra two month's pay, a railroad ticket for New York, and no more benefit of payroll. If there was no slip, Patterson invented one. He simply loved to fire people. He enjoyed seeing new faces.

Singleness of Purpose

Probably the most outstanding of Patterson's characteristics was his singleness of purpose (as contrasted to the multiplicity of the means he used to promote that purpose). He believed in his cash register. He was positive that no efficient business could be run without one. When he pushed its sale, he was certain that he was doing the entire country a service.

He was an earnest philanthropist. He wanted to improve living conditions for the people of Dayton where his factory was located, but in so doing, he forced the adoption of some of his own short-lived fads whether anyone else liked them or not.

"What is good for me is good for anyone," was his unvoiced theorem. But none of his beliefs lasted for long.

Witness the time he compelled all his factory heads to go horseback riding at 5:30 each morning with him—a regimen which was abandoned, along with its expensive stables—a month after it was put into effect.

His restlessness unceasingly led him on to new fads. Said he: "Only fools and dead men never change their minds." Yet, although his ideas changed with rapid-fire succession, he had implicit faith in each one while it lasted.

His diet and daily life were carefully regulated, but frequently changed. One week he and his staff would eat no meat. Next they would be stuffing themselves with spinach, like Popeye of the comic strips. Once a health fad led him to fast for 37 days.

In his conduct of business, Patterson was another living contradiction. Although he bungled his personal relationships and his regulation of life, and although he imposed cockeyed notions upon other people, his ideas in matters of business policy turned out to be almost invariably sound.

He thrived on criticism. It reacted on his energies like adrenalin in the blood-stream. Fearless, scornful of tradition, he struck out in new directions. His analytical mind and dominant will made him a dangerous opponent. He loved fighting when the outcome seemed doubtful, and like the St. Louis Cardinals under Branch Rickey, was at his best when the going was up-hill.

Unscrupulous? Possibly. But he did not think of his methods as being unscrupulous. To his monomaniacal mind, almost any means to the desired end was justifiable. It is doubtful if the thought ever once occurred to him that there might be such a thing as business ethics. He simply swept everything before him. His idea as to how competition should be dealt with is clearly presented in one of his terse statements, "We don't buy out; we knock out."

For years a "graveyard" was maintained near the plant. It contained piles of old cash registers, manufactured by competitors, with tombstones bearing the inscription, "Remains of the (company name) cash register. Put out of business (the date)."

(To Be Continued Next Week)

AIR CONDITIONING

Air Conditioning Solves Two of Lacquer Industry's Problems

BRIDGEPORT, Conn.—Air conditioning's part in solving two major problems of the lacquer industry—the "blushing" of a lacquer film immediately after its application, and the elimination of dust in lacquer rooms—was reviewed by A. Wilson Knecht, Yonkers, N. Y. consulting engineer, before the annual meeting of the American Electro-Platers' Society here recently.

Without attempting to evaluate air conditioning in terms of increased profits, Mr. Knecht confined his discussion to the costs and advantages of various types of systems.

Blushing Caused by Moisture

"Blushing" or whitening of lacquer film, he said, is caused by surface moisture, which has a tendency to throw the solids out of solution, producing a whitish or cloudy appearance. A draft of cold air, striking the work while it is drying, will produce a similar effect.

Air conditioning's value in this case, Mr. Knecht said, is in keeping the work from being cooled below the dew point, and in controlling drafts, so that they do not strike the lacquered surface.

Seasonal Variations Banished

Elimination of "blushing," he added, would do away with seasonal variations in work, and permit the turning out of a uniform product, regardless of weather conditions. While not a cure-all, air conditioning is a major step in eliminating present problems.

Mr. Knecht discussed air conditioning under two main classifications: 1) the method of altering the quality of the air, and 2) the means used in distributing the air to the space to be conditioned.

Use of Silica Gel

Application of hygroscopic materials (calcium chloride, silica gel, activated alumina) to air conditioning is a comparatively recent development, Mr. Knecht said, and while they cannot be said unqualifiedly to replace refrigeration in all cases, in lacquer rooms where air of low moisture content is desired, with dry bulb temperature of secondary importance, these materials are of special value.

The major source of refrigeration load in lacquer rooms, he said, is the enormous quantity of air exhausted through the hoods or spray booths. An amount of air equal to that exhausted must be cooled and dried before delivery to the room. In New York, sufficient air must be exhausted through lacquer spray booths to provide an average velocity through the frontal area of the booths of 100 c.f.m., and the exhaust cannot be below the quantity thus fixed, he added.

Heat Greater in Plating Room

Sources of heat and moisture in a plating room, Mr. Knecht said, are even greater than in a lacquer room. In a plating room are hot tanks, double offenders in that they give off both heat and moisture at the same time. In addition, there are motors, ovens, and the like.

To maintain a reasonable dry bulb temperature in these rooms, it is often necessary to insulate the sides and bottoms of all tanks containing hot water or hot baths, and to apply additional insulation to the ovens, Mr. Knecht pointed out. Installation of motors and motor generator sets in adjacent rooms wherever possible is helpful, he added.

Operating Costs Compared

Installation and operating costs of plating and lacquer rooms with a system using a volatile refrigerant were compared with estimated costs of operating the same rooms using a system employing hygroscopic material. Central duct distribution systems were used in both instances, and all factors affecting size of equipment and costs were made the same.

The lacquer room considered had 10 six-foot spray booths in operation at one time, was 75x20 ft. in size, with the roof and one side exposed to the sun. A dry bulb temperature of 85° F. was selected as optimum, considering the comfort of the workers, the rapidity of drying of the work, and the operating costs of the system.

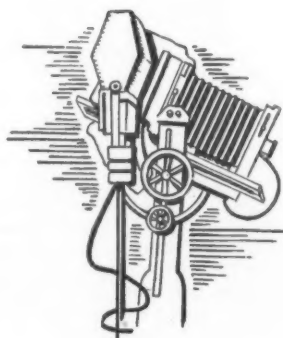
Cost by Hour

The refrigerant system considered used Carrene, and the absorption system silica gel. First costs were estimated at \$22,000 for the Carrene system, and \$23,000 for silica gel. Maximum cost per hour of operation was set at \$2.90 for Carrene and \$2.15 for silica gel.

The plating room studied was considered as being 80x25 ft. in size, with windows on two sides. The customary hot baths, ovens, motor-generators, etc. were considered as being insulated or provided with exhaust hoods, cost of the insulation or exhaust being figured in the original cost of the system.

Conditions of 85° F. temperature with a relative humidity of 50 per cent were considered optimum at lowest cost. Original cost of the system, using Carrene as the refrigerant, was \$8,000, against a cost of \$9,000 using silica gel. Operating costs per hour with Carrene were estimated at 87 cents, and with silica gel, 30 cents.

The use of "FREON" has made possible the safe air-conditioning OF RADIO AND PHOTOGRAPHIC STUDIOS



The Van Beuren Film Studios at New York City. "Freon" air-conditioned equipment installed by York.

FHA Urges Air-Conditioning Salesmen To Study Its Financing Possibilities

WASHINGTON, D. C.—Air-conditioning salesmen can materially increase their sales by reminding prospective purchasers that this modernizing equipment may be obtained under provisions of the National Housing Act, states a bulletin for the plumbing, heating, and air-conditioning fields issued by FHA headquarters here.

Business property improvement and repair can now be financed on a cash basis, with repayment in equal installments over a period from 12 to 60 months, the bulletin says. In this way, individual payments are scaled down to convenient sums, that can be paid out of income.

The new \$50,000 limit for business modernization credit, the bulletin says, makes it possible for practically every type of business structure to be modernized to insure a profitable future.

Salesmen should make arrangements for loans with some banker who is prepared to supply the necessary funds under the modernization credit plan, FHA officials advise. If

necessary, he can introduce the prospect to the banker, help him make out the FHA finance papers incident to the transaction, and assist in every possible way in obtaining the loan.

Time spent in educating prospective buyers in FHA financing, the bulletin says, will pay dividends in larger orders for air-conditioning equipment, and more profit to the salesman.

Drug Store Has First Unit Installed in Gadsden, Ala.

GADSDEN, Ala.—First air-conditioning installation to be made in this town was installed recently in the Usry Drug Co. here. The store is said to be one of the two air conditioned drug stores in Alabama.

Second air-conditioning job in this town was sold to Saks Clothing Store, ladies' ready-to-wear department.

Equipment for both installations was sold by Frigidaire Corp.

'Estimating Tables' Give New Data

Author: Ernest F. Jones. Publisher: Domestic Engineering Publications, 1900 Prairie Ave., Chicago, Ill. Pages: 68. Price: \$2.00.

Of interest to those who handle forced air heating and air conditioning for residences and other small buildings is this new book, "Jones' Estimating Tables," which deals with winter air conditioning, rather than summer cooling.

The book gives four sets of tables with degree differences of 90, 80, 70, and 60 and multiplying factors for c.f.m. requirements on nine different factors of heat loss.

Also included in this handy reference book are charts of duct sizes and conversion from round to rectangular; tables for determining register and riser sizes for supply and return air on the basis of c.f.m.; multiplying factors for changing from c.f.m. to B.t.u.

The book concludes with a concrete example of the application of the tables and factors.



The broadcasting rooms of station WCAE at Pittsburgh, Pa., are air-conditioned with "Freon" equipment installed by Frigidaire Corporation.



A "Freon" air-conditioning system, installed by Westinghouse, keeps the air cool and comfortable in the Rockefeller Plaza studios (New York) despite the extreme heat from the battery of lights.

THE VOICES of those who speak and sing are markedly affected by the air they breathe. Often when a singer is not "in voice," it is because of disagreeable atmospheric conditions. Dr. Verne O. Knudson of California Institute of Technology has shown, as the result of an erudite research, that temperature and humidity have a great effect on the absorption, reflection, and reverberation of sound. Radio studios are therefore rapidly air-conditioning with "Freon" equipment, both to protect the voices of their artists and for perfect transmission. "Freon" is non-toxic and non-flammable, and even if the artists breathed it in substantial concentration, it would not in-

jure their delicate vocal cords.

Photographic studios which have installed "Freon" air-conditioning no longer face long months of inactivity. The air-conditioning of photographic and motion picture studios has been made possible by the use of "Freon," a refrigerant which does not affect films and will not injure the health of photographers and their patrons.

Make it your business to see your local photographers and the managers of your radio stations. Give them a graphic description of the safety of "Freon" and the value of "Freon" air-conditioning—they are among your best prospects.



FREON

a safe refrigerant

KINETIC CHEMICALS, INC., TENTH & MARKET STREETS, WILMINGTON, DELAWARE

Federal Survey Shows Differences In Electric Power Rates

WASHINGTON, D. C.—Recently completed by the Federal Power Commission in an extensive Electric Rate Survey showing typical charges for electric service to residential customers in every city of the United States having a population of 50,000 or more. Included are billings to users of electrical energy for lighting, cooking, small appliances, refrigerating, and water heating.

Because of the important part played by the operating cost factor in influencing sales of electrical appliances, the findings of this survey should be of considerable interest to manufacturers of electric refrigerators and companion appliances.

The Federal Power Commission was authorized and directed to investigate rates charged for electrical energy by a resolution of the 73rd Congress shortly before its adjournment. Purpose of the survey was to secure accurate and comprehensive information regarding the rates charged for electrical energy and its service, not as an investigation of the reasonableness of the rates charged, but for fact-finding reasons.

Returns from the Electric Rate Survey were secured by means of questionnaires sent to officials of both private utilities and municipally owned and operated systems. In addition, a field force was distributed throughout the various states to contact heads of companies supplying energy. In all, contacts were established with officials of 1,825 private utilities and 1,969 municipal systems.

The survey brought out that wide discrepancies were to be found in the charges for like quantities of electricity. Taking several typical quantities of electricity as samples, it was found that great differences were to be distinguished between the charges in various cities. For example, the charge for 15 kwh. in Cleveland was 60 cents, the lowest amount recorded, while the high charge for the same quantity in Miami was \$1.71, a difference of 185 per cent.

Similarly, the charge for 25 kwh. in Cleveland was 88 cents in comparison with \$2.76 in Miami, and billing for 40 kwh. in Cleveland amounted to \$1.31 as against \$4.18 in Miami. Again the rate for 100 kwh. in Tacoma, Wash., was \$2.40 as compared with \$7.00 in Jacksonville, Fla.,

while cost of 500 kwh. in Tacoma was \$6.40 and billing for the same electricity in Yonkers, N. Y., was \$28.35.

The above examples should suffice to give electrical appliance manufacturers a picture of the diversified costs of operation of their products in various representative communities throughout the country. It seems logical to assume that the prohibitive cost of operation in some communities is responsible for at least a part of the difficulties experienced in building volume of sales in these territories. It should also point out the desirability for standardization of rate schedules for similar amounts of electricity to allow for reasonably economical operation of electrical appliances.

The final report of the Electric Rate Survey which is expected to appear in the near future will not only include the typical bills shown in preliminary reports, but will also present a comprehensive description and analysis of rate conditions, trends, and problems.

Among other topics will be a discussion of rural electrification, a subject which the commission feels is coming to occupy the center of the stage in circles interested in farmers' welfare. To date most companies have evidenced little interest in expanding this potentially great market for electrical energy, and the tendency has been to place the burden of initiative on the farmers. Certain companies, however, have developed aggressive policies with regard to this market and it is proposed to report on the important features of promotional activities and methods of financing extensions by such companies in rural territories.

A feature which should be of great interest to manufacturers and distribution outlets in the household appliance fields will be an analysis of various policies which have led to increases in purchases of electrical appliances. Sound and energetic sales activities on one hand and a reasonable plan for financing the purchase of appliances on the other are involved.

Included in the report will be a study of electric and gas appliances made by college students receiving FERA grants. Considerable information on the use and cost of operation of appliances will be contained. Pol-

cies for merchandising appliances which have met with success and which are of basic importance for cheaper electricity will also be reviewed.

The commission feels that the purpose of the great preliminary survey will be fulfilled if it succeeds in directing public attention to the wide divergencies in rates charged for electrical service in communities similarly situated and possessing the same general characteristics.

BOOKS

How to Get a Better Job

Author: Eugene Whitmore, Editor of American Business. Publisher: The Dartnell Corp. Pages: 128. Price: \$1.00.

THIS little book is written in a sincere, intimate style, and is addressed to the reader personally. It does not seem to be a "typical success book"; but rather is a practical guide to a better job and greater compensation. The author has based his observations on stories given him in interviews with 3,000 successful men.

Each principle enumerated by the author has pertinent examples given to illustrate how the principle worked for some other man. He uses for the most part, actual names of men and companies.

"You can get any job you want—if you go after it in the right way." This is the challenging first sentence of the book.

The first thing a person must do to get a better job, claims the author, is to know exactly what job he wants. "Pick some kind of work you want to do. Get into something that makes your spinal column vibrate with glee every time you think of it. Have a love for your work which will permit you to stop at nothing legitimate until you have achieved your desire."

In selecting the job he wants, a man should try to suit his desires to a business that is bound to make rapid strides, such as refrigeration, air conditioning, Diesel engines, coin operate games and machines, chemical industries, prefabricated houses, etc.

The author suggests a list of things to do in obtaining a better job as follows:

"(1) Make a list of every possible market for the kind of work you have decided you want to do. (2) Ascertain beforehand the name of the man who can give you an answer in each place. (3) Prepare a prospect card on every employer you list. (4) Write on this card the names of all mutual friends, or any possible men who may help you land the job you want. (5) Write, wire, or make a personal call on every prospect you list until you land the job you want."

Another way to get a better job, he points out, is to watch the display and classified advertisements in the daily newspapers and especially trade publications in the field that particularly interests the individual desiring a new job.

Many men, the author writes, obtain better jobs through the suggestions, intervention, or help of their friends and business associates. When asking others to help, however, one should not put himself in a position of "begging" aid, but should tell what he wants to do, his qualifications, and ask them to let him know of any opening they may hear about.

Business is alive with opportunities for those who can contribute to the profits of a business and not merely add to its fixed expense. The man seeking a job should let the employer know that he puts desire to serve ahead of the desire for gain.

With regard to compensation the author believes one should let the employer make the offer. If the figure is too high, the job may be lost. If it is too low, he may accept it as the job-seeker's estimate of his own ability.

Sales work is the best stepping stone to a bigger and better job, says Mr. Whitmore, because in that work one can learn more about what makes a business go than anywhere else, unless it be confidential secretary to the president of a company.

"Don'ts" to be remembered when interviewing a potential employer, as listed by the author are: 1 Don't beg for a job. 2. Don't be breezy. Don't talk too much. 4. Don't fidget. 5. Don't mumble. 6 Don't giggle—criticism usually applied to young girls. 7. Don't argue. Try the "yes, but" method. 8. Don't overstay your welcome.

The book concludes with a short story on "How Two Men Grasped the Big Opportunity"—and these men are none other than P. B. Zimmerman and T. K. Quinn of General Electric. The story, written in the personalized style of the author, is as follows:

"Greater responsibilities are ahead for you; but you must prepare for them. You must have confidence to grab them. You must be on the lookout for them. When they come you must take them seriously, just as

Sales Idea of the Week

By V. E. Vining, Director of Department Store Sales, Westinghouse Electric & Mfg. Co.

Listen—don't exaggerate. Be temperate in all things.

You can't out-claim your competitor. He is just as good a claimer as you are.

I know you have been taught that the particular Gadget you are selling is the greatest of its kind in all the world; and I know you, and the man who taught you the story, and the man who makes it, are sincere.

But down the street you have a competitor who believes the same thing about his Duhinkus.

And he, too, is sincere, and he is no dumbbell; he doesn't beat his wife or stick pins in little children.

And he, too, has a bunch of satisfied customers.

Exaggeration won't down him; senseless ridicule won't affect him; belittling his appliance will send prospects to see it; overstatement of your claims merely gives him a chance to make you look silly.

There is just one way to lick the tar out of him.

Tell the truth to your prospect. Admit your competitor's virtues gracefully when the question is brought up, and then go on hammering your own story—truthfully and sincerely.

And you won't have to wait until you get to Heaven for your reward.

After your competitor has lost a few sales through exaggeration and over-claiming, he, too, may see the light, then—

Both of you will do more business.

P. B. Zimmerman and T. K. Quinn did when General Electric officials let it be known that they had an electric refrigerator ready for the market. Quinn was in the credit department of General Electric. Zimmerman was employed as editor of company publications. Word was informally passed around among company employees that a plan for marketing the refrigerator had not been completed, and suggestions from employees would be welcome.

"Zimmerman and Quinn grabbed the chance. They put their heads together and worked out a detailed plan for marketing General Electric refrigerators. Every possible angle was covered, every possible question that would bear upon the distribution and sale of refrigerators was investigated. While other employees wrote brief memoranda, or passed on verbal suggestions, Zimmerman and Quinn worked and planned, wrote and wrote. When they submitted their plan, it was evident from the first glance that they had put some thought in it, burned some midnight oil preparing it.

"They were called to New York for a further discussion of the plan with high officials of the company. When all the conferences were over it was evident that not only was the Quinn and Zimmerman plan the best, but that Quinn and Zimmerman were the men to put the plan into action.

"The remainder is business history. General Electric refrigerators hit the market with a bang that is still echoing throughout the industry. Their original plan may have been expanded and improved but it is still essentially the method used by General Electric and, if you will excuse my ending the book with a slang phrase, Quinn and Zimmerman are 'sittin' pretty.'"

Glasco Sales Better Total for 1934

KANSAS CITY—To announce that sales of Crosley electric refrigerators in Kansas City at the end of April this year were greater than the total sales for the entire year of 1934, the Glasco Electric Co., Crosley distributor here, held a meeting and dinner at the Sni-A-Bar Gardens, reports George Hayden, Glasco sales manager. Approximately 200 Crosley dealer retail salesmen attended the meeting.

Lee Center's Lone Ice Man Buys a Westinghouse

LEE CENTER, Ill.—Roy Conibear, local Westinghouse dealer, recently sold a Westinghouse DLX-78 electric refrigerator to the village ice man. Lee Center has a population of only 300 and Mr. Conibear has sold every electric refrigerator that has been purchased in the town.

VIRGINIA SMELTING Company
WEST NORFOLK, VIRGINIA
15 BAKER ST. N.Y. - 135 STATE ST. BOSTON

Extra Dry ESOTOO
LIQUID SULPHUR DIOXIDE
V-METH-L
METHYL CHLORIDE

Dealers Cooperate in Contest Featuring Unit Features

BIRMINGHAM, Ala.—A new slant to brand merchandising was given recently by five refrigerator dealers of this city who smashed the newspapers for two or three weeks with page cooperative advertisements in an unusual contest in which cash prizes were offered for the correct answers to the question "What Refrigerator Has" such and such a feature.

The super freezer in the Frigidaire was featured by Killgore Furniture Co.; forced-feed lubrication in the General Electric product by Smith Appliance Co.; Carrene the refrigerant by E. E. Forbes & Sons; no moving parts in the Electrolux by the Birmingham Gas Co.; and air conditioning in the McKee Ice refrigerator by the City Ice Delivery Co.

Birmingham Electric Co. cooperated by featuring its "half-price" electricity.

HALSEY TAYLOR Electric WATER COOLERS

EASILY INSTALLED - MINIMUM SERVICING

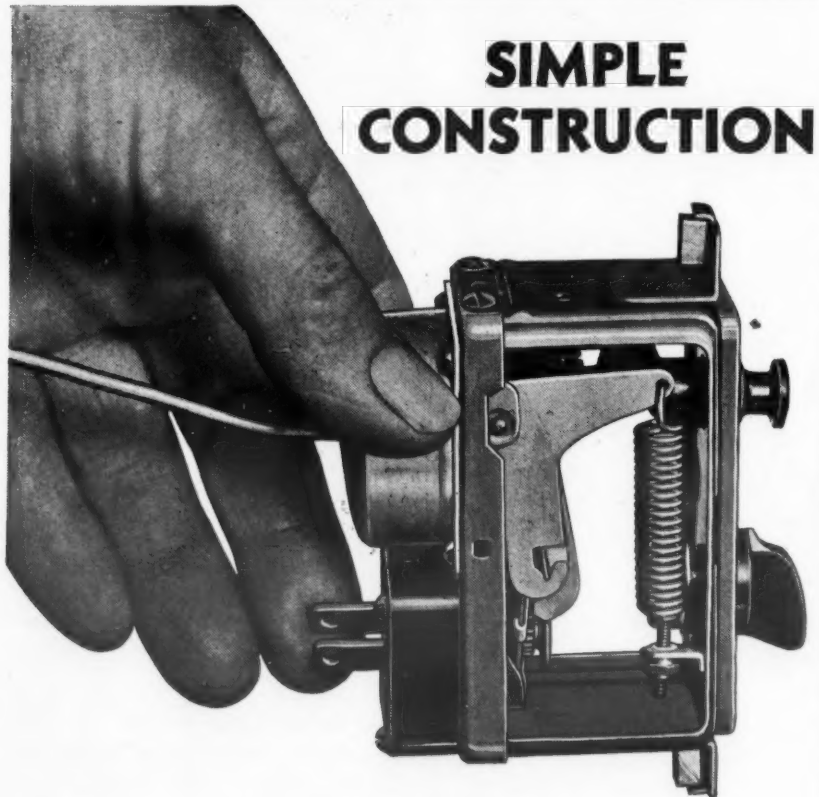
10 ATTRACTIVE MODELS GREEN CRINKLE FINISH

THE ONLY COOLER WITH SANITARY TWO STREAM PROJECTOR

DISTINCTIVE SALES ADVANTAGES LIBERAL DEALER PROFITS

Halsey Taylor Electric Coolers are giving satisfaction to hundreds of users throughout the country, including the Government, industrial plants and offices everywhere. Get our liberal dealer proposition... phone, write or wire collect.

The Halsey W. Taylor Co. Warren, Ohio



THE Rancostat is the refrigerator thermostat of simplified construction. With fewer working parts each of these parts can be made stronger and machined more accurately. Fewer parts also means the reduction of friction—more space for final inspection and adjustment—and fewer adjustments to make.

Rancostat's adjustments and temperature settings are definite, positive and permanent.

SIMPLICITY MEANS DEPENDABILITY.

Write for Rancostat bulletins and list of distributors.

THE AUTOMATIC RECLOSING CIRCUIT BREAKER CO., Columbus, Ohio

RANCOSTAT
The Stainless Steel THERMOSTAT

AIR CONDITIONING

Fernald Tells Why Hotels Present Big Market for Cooling

OMAHA—No business enterprise requires air conditioning to the extent that hotels do for the reason that hotels are a 24-hour-a-day institution, asserted J. M. Fernald, general manager of Baker Ice Machine Co., in a speech given before the Nebraska Hotel Association here recently.

"They are furnishing a 24-hour service to their guests," he said, "as contrasted to the average daily service of less than half a day in shops, banks, offices, theaters, etc."

Mr. Fernald believes that the hotels have suffered a loss of business and revenue from two major causes—the depression, which forced everyone to be more economical, and modern transportation, cause of cabin camps and roadside stands.

Must Sell Conveniences

Hotels cannot meet competition of cabins on a price basis, the speaker declared, and so the hotel man should make his establishment and the service and conveniences he offers especially attractive.

"Install air conditioning as the principal step in your fight for business," Mr. Fernald advised. "Install it in your coffee shop, anyway, and right away, too. If at all possible, do not stop there—air condition your main dining room, private dining rooms, ballroom, lobby, barber shop, and even your sleeping rooms."

Added Cost—\$200 Per Room

"I am not trying to sell something, but am trying to sell you the idea that is bound to help your business. To air condition sleeping rooms is not the problem you may think it is. The average first class hotel has an investment of from \$1,500 to \$2,500 in each sleeping room. The installation of air conditioning in sleeping rooms will mean an investment of around \$200 per room."

There are only two reasons why a hotel man would hesitate to install air conditioning, thinks Mr. Fernald—first, that he does not believe it is sufficiently perfected, and secondly, that if he waits until next year, it will cost him less.

"The accepted standards of equipment as produced by leading manufacturers of air conditioning equipment today," he continued, "will not be obsolete for many years."

No Great Price Drop in Store

"As to prices being lower next year, the principal elements of reduced prices are the reduced cost of selling as general public acceptance increases, and reduced manufacturing costs as manufactured volume increases. There will also be some gradual reductions through improved efficiency in the methods of applying the equipment. However, all of these items will not reduce the price a great deal."

"I do not believe that the cost of air-conditioning installations will be reduced much faster than 10 per cent a year, and should level off in three or four years to an approximate cost."

There is a need for experts in the air-conditioning field, claims Mr. Fernald.

"Air conditioning has been heralded as the industry that would pull the country out of the depression. Consequently, the influx into this industry has been tremendous. The result is that many whose business was confined to selling fans, blowers, and ventilating equipment of all types having a point of contact with air conditioning are now established as air-conditioning specialists."

"There is a science to air conditioning just as there is a science to operating a hotel. No science can be mastered quickly."

Describes Air Conditioning

In non-technical language, Mr. Fernald explained air conditioning as follows:

"The comfort or discomfort felt by the human body is determined by the temperature, the moisture content, and the rate of movement of the air. Air conditioning installations that are not designed with due regard to these factors can only give the desired results by accident."

"The reason that lowering the temperature alone will not produce human comfort is due to the fact that the excess heat of the body must be given off to the surrounding air. If the surrounding air is motionless and highly saturated with moisture, the excess body heat will not be absorbed by the air."

"Therefore, the air must have some of its moisture removed and the air kept in motion to efficiently absorb the excess of body heat, which results in human comfort."

"Air conditioning must introduce a certain amount of fresh outside air to offset the chemical decomposition of the re-circulated air. This fresh air is passed through filters to remove the latent dust and dirt."

CWA Research Project Tells How to Improve Oil Burner Operation

TORONTO, Canada—Too many installations of oil burners have been made without regard to inefficiencies that result in excessive heating costs, weakening the position of the competitive position of oil burning with other methods of heating, declares Prof. D. W. Nelson of the University of Wisconsin in reporting the results on investigations made under a CWA project.

"Most burners work on the intermittent principle," said Mr. Nelson, "and when the call for heat is made the burner starts, combustion improving as temperatures increase in the brick work of the combustion space."

"The burner runs varying lengths of time and makes a varying number of starts depending upon the heat requirements of the building at that time. Newer temperature control systems give very close regulation of temperatures, and the running periods are consequently shorter and more frequent."

Off-Period Losses Increased

"This tends to increase the off-period losses which result from the cooling off of the brick work and heating surfaces with the passage of air through the heating unit while the burner is shut down."

The study which Prof. Nelson conducted was made on a pressure atomizing burner with positive or fan air supply. The tests were made on a laboratory installation completely equipped for testing, and on a residence installation under actual conditions of heating.

In the laboratory tests a closely fitting damper was placed in the smoke pipe near the boiler outlet. Tests were made to determine the difference of efficiency with various on and off periods for operation with and without the damper.

Greatest Savings for Shortest Period

Results showed the greatest saving for the damper for the shortest periods of operation, Prof. Nelson said. For best efficiency the burner should operate almost continuously under maximum heat requirements, the speaker said, and in the locality of the tests the average load is about one-third the maximum. This indicates an average loss of about 9 per cent that might be eliminated by the prevention of air circulation through the combustion space during off periods.

Second part of the study of the off-period loss was made in a residence heated by a pressure atomizing burner installed in a rectangular steam boiler of eight sections.

A fuel burning rate of 1.8 gal. per hour in this system gives ample capacity for warming up period in the morning when operated on dual (lower night temperatures) control. The system operates on pressure control for several hours during the warming-up period in cold weather indicating sufficient burner and boiler capacity.

An automatic damper was installed in the smoke pipe near the boiler outlet. The damper was operated by an electric motor similar to that used for operation of draft dampers on hand-fired installations arranged for thermostatic control.

Damper Controls Whole System

The room thermostat caused this motor to open or close the damper to suit the demands for heat. The oil burner was controlled through this damper by switches of the mercury type attached to its shaft. When the damper was in the open position, the burner controls caused it to start, and when the damper motor caused the damper to begin to close, the controls stopped the burner.

The cycling controls of the burner allowed about a minute between the damper assuming the open position and the starting of the burner. The early breaking of the burner motor circuit upon the turning of the damper from the open position, and the slow operation of the damper motor gave considerable time for burnt gases to be cleared from the combustion chamber at the close of a period of operation.

The effect of the damper on the amount of fuel used was observed with continuously maintained inside temperatures and with dual or lowered night temperatures.

"The saving found by the use of the damper was 7.2 per cent for dual temperature control and 8.9 per cent for continuous control," remarked Prof. Nelson. "The latter figure is high because of differences in sun effects, and the 7.2 per cent is considered somewhat lower because of the method of damper operation."

"The room thermostat controlled the operation of the damper. During the warming up period each morning, there was a time when the burner

was controlled by the steam pressure limiting device which allowed the steam pressure to vary between ½ lb. per sq. in. and 4 lbs. per sq. in."

"The colder the weather the longer the period of such pressure controlled operation and during all of this period the damper remained open continuously. Since the starts and stops are quite frequent and the brick would be at red heat, the loss in off periods during these warming up times would be appreciable. Therefore, the figure of 7.2 per cent saving for the damper during the dual operation is considered to be somewhat low."

With respect to the second part of the investigation, Prof. Nelson declared that in the laboratory it has not been found difficult to make an installation that would result in 10 per cent CO₂ with clean burning on intermittent operation.

"Previous miscellaneous tests in residence installations," said Prof. Nelson, "has indicated a wide variation in the efficiencies of combustion and heat absorption. As an example, when the oil burner was first installed in the residence on which the damper study was made, the CO₂ obtainable without smoking was 6.0 to 6.5%."

"This was brought up to 8 and 8.5 per cent by various alterations up to the time of the damper study. By rebuilding the combustion space, there is no reason why 10 per cent should not easily be secured."

"Since the tests made on various residence installations had indicated wide variations in efficiency, it was considered worth while to make a survey of as many residence installations as possible in order to find the

variations and the average figure for present installations."

Prof. Nelson stated that readings were taken on 141 residence installations. Steam systems represented 78 of these, hot water systems 29, and warm air 34. Burners of 28 different manufacturers were represented.

Main items desired were the CO₂ readings indicating the extent of the loss from excess air and the flue gas temperature, which while dependent to some extent on the excess air is also dependent on the rate at which the oil is being burned and ability of heating surface to absorb that heat.

These two readings, Prof. Nelson pointed out, give a means of finding the largest part of the losses in the form of heat passing up the chimney, and the maximum possible efficiency of the installation.

Considering 10 per cent as a reasonable standard, 24 installations proved to be as good or better than might be expected. Six installations were operating with such a low excess of air that the CO₂ was 12 to 13%.

As great a number as were above the dividing line of 10 per cent were below 6 per cent, which indicates in these cases the use of an average of about 200 per cent excess air.

"In some cases only a change in air adjustment might improve the CO₂ determination, while in other cases the large amount of excess air is necessary due to faulty fuel preparation or lack of mixing of fuel and air at proper temperatures," stated Prof. Nelson.

The survey showed that the number of installations having some means of humidification was 63 as against 70 without any such means. In warm air

plants, two out of 33 had no humidification method, in hot water plants 13 out of 23, and in steam plants 55 out of 77 had no means of supplying moisture to the air.

Twenty-seven reported savings which averaged 29 per cent with the changing from hand-fired solid fuel to oil burning. Sixteen reported the same cost with the two methods of heating, and 16 reported an increased cost of 23 per cent with the change from solid fuel to oil burning.

In some of the cases where savings were obtained a new boiler, furnace, or heat saver was installed at the time of change.

"Based on 52 installations," declared Prof. Nelson, "the cost per sq. ft. of floor space per year with oil heating was 7.7 cents and with solid fuel 8.2 cents."

"The cost per room per year with oil burning figured out as \$15.93 and with coal \$16.58 for cases reporting costs for both fuels. These costs, of course, depend upon the unit price of fuel during the years involved."

In conclusion, Prof. Nelson stated that a survey of some 140 residence installations indicated a stack loss of 27 per cent as determined by a CO₂ average of 7.8 per cent and an average flue gas temperature of 634° F.

An analysis of costs of oil heating on a unit floor area basis indicates a relation between cost of fuel and efficiency as shown by CO₂ and flue gas temperatures.

A reasonable though arbitrary standard for an efficient installation, said Prof. Nelson, would appear to be 500° F. and 10 per cent CO₂ without smoking, which corresponds to a stack loss of 18.5 per cent.

ANNOUNCING a New Series

of FEDDERS

Dual Purpose

Dry Expansion

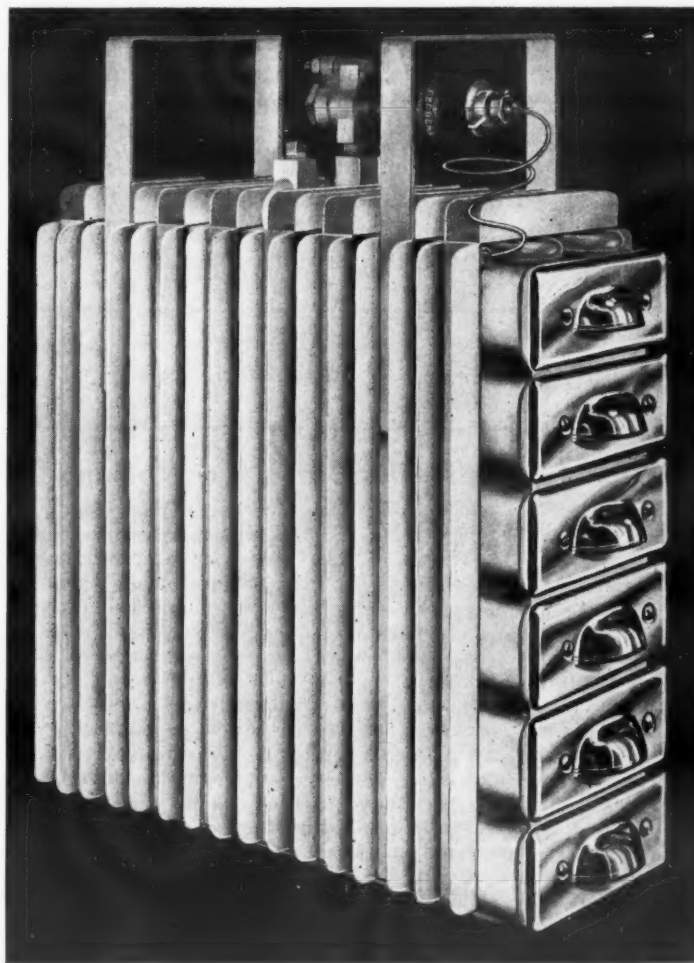
FINNED

EVAPORATORS

For Ice Cube Making

and Heavy

Duty Cabinet Cooling



COMPLETE LOW SIDES WITH FEDDERS MODEL 33 THERMOSTATIC EXPANSION VALVE AND TRAYS



FEDDERS ICE CUBE MAKER REFRIGERATOR

Hot Weather Makes this a Hot Seller

Hotels, restaurants, clubs and institutions need plenty of ice cubes, and Fedders Ice Cube Maker Refrigerators give them 576 cubes per freezing. Complete with cabinets finished in vitreous porcelain, flooded or dry expansion evaporators and Fedders Model 33 Thermostatic Expansion Valve, they occupy floor space about 2 feet square. It is a hot seller RIGHT NOW.

A complete line of Series "DF" finned evaporators made in 2 to 8 tray sizes, together with Series "FCF" 6 and 8 tray finned evaporators is announced to meet the demand for combined ice cube making and heavy duty cooling for medium and large refrigerators, back bar cooling, hotel and restaurant refrigerators, etc.

Through the cooperation of the many leading manufacturers of refrigerators we engineered these units to meet the dimensional specifications of the many and various cabinet sizes encountered in the field today.

These new evaporators are sold as complete lowsides including Fedders Model 33 Thermostatic Expansion Valves and ice cube trays as standard equipment. They are arranged for either bottom or top refrigerant feed, with connections mounted on top of the evaporator. Thermostatic Expansion Valves are installed for bottom feed as standard, unless otherwise specified.

They are designed for fast freezing of ice cubes with refrigerant tube bonded to top and bottom of each tray sleeve. Fins are bonded to tray sleeves for efficient heat transfer for cabinet cooling.

DF models are equipped with 27-cube trays and FCF models have 36-cube trays.

FEDDERS MANUFACTURING CO.

57 TONAWANDA ST.

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New York

603 W. Washington Blvd.,
Chicago

303 E. 6th St.,
Cincinnati

209 S. Pearl St.,
Dallas

923 E. Third St.,
Los Angeles

ARE YOU GETTING YOUR COPY OF THE FEDDERS NEWS?

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Four Specialty Selling Issues - - and Why

PREVIOUS late summer selling campaigns—attempts to extend the refrigerator selling season into August and September—have rarely succeeded in measuring up to the hopes of sales managers in the industry. Frequently they have been puzzled about the "fizzling out" of these campaigns, too; for the weather is generally hot in August and September, and the inducements-to-buy are often more enticing than prices and terms available in the spring and early summer.

One theory which has been advanced to explain the difficulty of getting salesmen to continue their fast pace through August and September is that by the middle of the summer their energies and ambitions are well spent. The best of their prospects have been sold, sales appear to become increasingly hard to wangle as they work down to the bottom of the prospect file, and (perhaps most telling of all) they have money in their pockets. They have worked hard and fast, they can easily convince themselves that the cream and much of the milk from the market has been skimmed, and so they find it easy to obey that impulse to go fishing or see a ball game.

This season, however, there are probably few salesmen who are genuinely satisfied with the results of their efforts to date. Business may have been good, but their prospect files are replete with names of families which have postponed buying because of the cold weather which held sway until so recently. Unquestionably the season started late; and this year, perhaps as never before, dealers and salesmen are in the mood to postpone their vacations until late fall while they catch up on their homework among families which need more adequate refrigeration facilities.

Most of the manufacturers are preparing to inaugurate special campaigns and contests to spur salesmen and dealers on toward maintaining peak selling effort through August. Westinghouse already has a contest in progress. Crosley instituted a special drive last week at a mid-summer sales convention, at which President Powel Crosley, Jr., declared: "I feel that we have a wonderful opportunity to carry on with electric refrigerator sales as long as summer lasts. The refrigerator season will no doubt continue longer than in other years."

ELECTRIC REFRIGERATION NEWS proposes to do its share toward prolonging the selling season this year, too. A series of four special issues devoted to merchandising methods and problems will appear during August, right at the time when such extra "how-to-sell" information should prove most useful. (Aug. 7, 14, 21, and 28.)

Detailed analyses of the operating methods of successful dealers and distributors, together with practical studies of promotion methods used effectively this summer by representative dealers, will appear in these four issues. Especial attention will be given to plans developed by overstocked dealers to move large inventories

without resorting to price-cutting. Ideas for compensating and rewarding salesmen for extra effort during a special campaign will be considered. New schemes for sales contests, with complete and detailed information for staging the entire program from beginning to end, are scheduled for inclusion in these special merchandising issues of ELECTRIC REFRIGERATION NEWS. It is also planned to give editorial and pictorial recognition to dealers and salesmen who are doing outstanding jobs this summer.

In these four August issues will appear the most useful instalments of the editor's story about the development of the specialty selling formula (told in terms of the life of John Patterson, the "Father of Modern Specialty Salesmanship"). This study of the origins of such integral features of modern appliance distribution as the sales convention, sales contest, sales manual, guaranteed territory, field supervision, "using the user" plans, and the standard sales presentation is designed to give salesmen an intelligent background on, and better understanding of, modern sales methods—which they either may take for granted, or be inclined to regard as more or less superfluous fol-de-rol.

Older salesmen and executives in the industry, of course, know about John Patterson and the origins of the specialty selling idea; but to more recent additions to the industry's sales forces, this story may prove enlightening and instructive. Beginning in the current issue with an essay on Patterson as an individual, the series will run serially through the remainder of July and August issues.

Rather than continue to complain about the lateness of the spring and the size of field stocks, the News feels that the industry will do well to stage the strongest promotional and merchandising campaign in August and September it has ever attempted. For the first time there appears to be a genuine opportunity to extend the selling season through those months, and the industry should waste no time in preparing to take advantage of this opportunity.

WHAT OTHERS SAY

Types of Advertising for Women

TYPES of advertising which women do not like were described by Mrs. Anna Steese Richardson, associate editor of *Woman's Home Companion*, at the recent meeting of the American Association of Advertising Agencies.

Among these types she included testimonial advertising by movie stars and wealthy society women, cartoon advertising, advertising that smacks of sex appeal, and medical supply advertising which is in poor taste.

"They like pictures," Mrs. Richardson said. "Visual advertising, as well as visual education, is popular. Why read about China when you can see a travelogue?"

"Women like color. Women want beauty in advertising pages. The less they have in their homes and the more drab their lives, the more beauty they want in advertising. They are interested in what their children like. Their natural curiosity of boys makes them habitual coupon cutters. Remember there are some 20,000,000 mothers in U. S."

Speaking of the necessity for convincing advertising, Mrs. Richardson told of some of the resistance to advertising which has been built up in various quarters. "In the federated and unfederated clubs, in the League of Women Voters, in the American Home Economics Association, I met the bitterest antagonism to advertising. The propaganda was started three years ago by the U. S. Government in its entirely just and sincere desire to strengthen the regulation of foods, drugs, and cosmetics. Then came the Consumers Research, Inc., with its bulletins, published ostensibly to inform consumers on adulterated foods, drugs, and cosmetics, but more directly to increase the sales of books written by its founders, such as "100,000,000 Guinea Pigs," etc. All in all, this sort of propaganda has reached and thoroughly permeated organized women to the number of 6,000,000."—*Domestic Commerce*. (Issued by Bureau of Foreign and Domestic Commerce, U. S. Dept. of Commerce.)

READERS of trade papers wonder sometimes, according to mail we receive, why the activities of gyps are "played up" apparently out of all proportion to the financial importance of their enterprises. They often brand such a tendency as being imbued with a tinge of yellow journalism.

They are wrong, of course. A real trade paper, one that has no space at all for gossip about the personal affairs of show people, jumps at the opportunity to "play up" gyp activities because its publisher and his associates realize that publicity is the most effective weapon that can be used against a crook. Murder isn't generally committed in the line of a spotlight. Shady dealings and frank, outspoken comment can't possibly go hand in hand.

Gyps will cease to operate as soon as those they victimize become thoroughly conversant with the mechanics of trade paper journalism. If Jim Gyp strands a company and files the coop and if the victims throw aside fear and tell their story to a trade paper there isn't much chance of Jim pulling any more stunts for a long time to come.—*The Billboard*, July 13, 1935.

LETTERS

Doubts the 'Late' Mr. Lahey

Erie Lighting Co.
21 West 10th St., Erie, Pa.

Editor:
I have been reading ELECTRIC REFRIGERATION NEWS for several years and have enjoyed reading from time to time how some of the boys on the firing line, stick to the guns when they have a hard prospect to close.

However, the story of Mr. Lahey on page 6, column 2, ELECTRIC REFRIGERATION NEWS dated July 10, sounds like the story some of the boys take home to their wives if and when they happen to be too late getting home.

E. J. MALEY,
Sales Director.

Service Men: Attention!

Anderson Radio & Electric Co.
Virginia Dare Hotel Building
Elizabeth City, N. C.

Editor:
We are looking for a company that is qualified to handle repairs on Majestic refrigerators and knowing that your magazine to be the authority on refrigeration we are writing you.

We would like to have a company to handle our replacements and repairs that are not located so far from us.

WM. J. ANDERSON,
Secretary-Treasurer.

The A. J. Alsdorf Corp.
223 W. Jackson Blvd., Chicago

Editor:
Could you supply us the name of a firm in Chicago who can repair Majestic hermetically sealed units.

M. RONAN.

Wants 'Sam' Via Television

E. T. Williams
Consulting Engineer
51 East 42nd St., New York City

Editor:
Among the numerous interesting items appearing in your Bible of the industry Sam Vining's "Sales Idea of the Week" are by no means the least intriguing. They are short, snappy, and to the point. You are both to be congratulated on this hook-up.

It is to be regretted that these ideas cannot be delivered personally by their author by means of television so that we might listen to his melodious voice and join in his contagious smile.

E. T. WILLIAMS.

How to Get Newcum Series

P. O. Box 135
Montvale, N. J.

Editor:
Received my first issue since subscribing and am very well pleased with its contents.

What I'd like to know is if there are any available back copies that I may purchase. Wish all issues that contain back series of lessons as given by Mr. K. M. Newcum since these were started. According to issue received these would be lessons Nos. 1 to 10 inclusive.

I am a student of Utilities Engineering Institute of Chicago and feel that I can't afford to miss any outside instructions I can obtain.

At the time of remitting for this subscription I'd have liked to also ordered on your combination rate but did not wish the MARKET DATA BOOK; only wish the REFRIGERATION DIRECTORY. What would be the price of this Volume I alone?

ALEXANDER COLLINA.
Answer: Mr. Newcum's series of articles started in the April 10 issue. We can furnish all of these issues to date with the exception of the June 5 issue which we no longer have in stock. Back issues sell for 10 cents each.

Price of Volume I of the Refrigeration Library, 1935 REFRIGERATION AND AIR CONDITIONING DIRECTORY, is \$3. We do not offer a combination rate for ELECTRIC REFRIGERATION NEWS and one volume of the DIRECTORY.

"This is the best money I ever spent."—H. H. Lamb, West Texas Utilities Co., Third & Cypress St., Abilene, Tex.

"I have not received my ELECTRIC REFRIGERATION NEWS since June 12. Please send it along. Your paper is a great help to anyone in the refrigeration business."—John Gerrish, Jr., Box 217, Dixfield, Maine.

"Just cannot do without your paper and successfully stay in the refrigeration business. Be sure and send us a copy of the latest specifications of all makes."—G. C. Henne, Henne Electric Co., 408 North Park Ave., Herrin, Ill.

"I am just a student in electrical refrigeration but I sure think you have a swell magazine and I get a lot of help and information out of it."—Harold Berg, 653 East Second St., Winona, Minn.

Home Air Conditioning

P. O. Box 1601
Phoenix, Arizona

Editor:
Attached is my check for \$3 for one year's subscription to ELECTRIC REFRIGERATION NEWS. Please start it at once.

I am interested in securing the names and addresses of air-conditioning units for the home—room coolers. If you have any names of manufacturers not shown in your directory or if you have any directories left will appreciate it if you will give me a list of manufacturers of this equipment. I am particularly interested in any Pacific Coast manufacturers of this equipment if there are any.

If you have recently published any special issues on Air Conditioning for the Home—please send me a copy of it.

T. F. PENROD.

Answer: A complete list, with addresses, of manufacturers of various types of air-conditioning equipment, including room coolers, is published in the 1935 REFRIGERATION AND AIR CONDITIONING DIRECTORY.

Specifications of all models of air-conditioning equipment made by leading manufacturers were published in the May 22 issue of ELECTRIC REFRIGERATION NEWS.

While no one particular issue of the News has been especially devoted to the subject of air conditioning for the home, the weekly issues have been literally crammed with informative material regarding all phases of air conditioning.

Following are a few selected references to articles of special interest to those interested in the air conditioning of homes:

"Detroit Edison Report of Home Cooling Research," May 22 issue.

"Dr. C. A. Mills Tells What Air Conditioning Will Do for the User," April 24 issue.

"Apartment Building in Boston Remodeled for Air Conditioning" and "Study of Summer Cooling in the Research Residence in 1934," February 27 issue.

"Advancements in Air Conditioning Design and Applications During 1934," January 9 issue.

"Economics of Comfort Cooling Discussed by Mersfelder," December 26, 1934 issue.

"Model Air-Conditioned Home Featured by Control Instruments," November 28, 1934 issue.

"Oklahoma City Model Home Has Year 'Round Air Conditioning," October 17, 1934 issue.

"Air Conditioning of Electric Refrigeration News Offices," August 29, 1934 issue.

"How to Estimate Size and Costs of an Air Conditioning Job," July 25, 1934 issue.

"E. T. L. Tests Give Engineering Data on Conditioning Units" and "How One Frigidaire Room Cooler Gives Comfort Cooling for an Entire House," June 27, 1934 issue.

Anyone interested in air conditioning should not have missed the May 29 or June 26 issues of this year which reported, respectively, the spring meetings of the American Society of Refrigerating Engineers, and the American Society of Heating and Ventilating Engineers. At both of these meetings air conditioning was a principal subject of discussion at the technical sessions.

Why the H---?

1924 Livingston St.
Allentown, Pa.

Editor:
Why the hell did you stop your paper. You know I have paid you every year since you first published it! If there was another as good I'd stop you off. You should know this is a busy time with we boys.

W. R. ZACHARIAS.

Directory Data Complete

The Hoover Co.
North Canton, Ohio

Editor:
We have received the 1935 REFRIGERATION AND AIR CONDITIONING DIRECTORY, Volume I, and are looking forward to the arrival of MARKET DATA BOOK, Volume II.

This publication is very well arranged and the data is quite complete. It serves our purpose in a very satisfactory manner and we have no suggestions as to improving it.

DWIGHT MOODY,
Engineering Department.

All Worn Out

Box 161, Hines, Ill.

Editor:
My April 3 issue of the News has been used so much it is beyond reading and could you please forward another copy. The specifications of the commercial machines are a big help to us.

ALFRED WOOLLVEN.

"Please find our O.K. for another year's subscription to your paper. We like it very much."—Stockton Fixture Co., 140 N. California St., Stockton, Calif.

LETTERS

**Mr. Willoughby Answers
For the Ice Industry**

REFRIGERATION
Technical and Business Paper of the
Refrigerating Industries
Atlanta, Ga.

Publisher:

I have just returned from a wonderful fishing trip—193 pounds of Silver King Mackerel in one day. If you have ever had such an experience, you know that it takes one back to fundamentals.

Somewhat I think you must have had a good fishing trip before writing the editorial, "Ice Industry Shows Signs of Awakening," in your June 19 issue.

As a publisher for the competitive side of the picture, may I not congratulate you upon the thoroughness and the clearness with which you have visioned the new competition from the ice industry.

The ice box hurt the ice industry more than any and every other factor. The electric box, if continued, will hurt the mechanical industry more than everything else. You are right when you say that a small box is not the answer for the small income market.

I rather wish, however, instead of "The leading ice publisher is now seeking to serve the mechanical-chemical end of the refrigeration business," that you had designated the paper by name. The ice industry now looks upon *Refrigeration* as its leading publication. This is attested by the fact that we publish daily "Ice" editions to all National Ice Conventions and have a greater "monthly" ice company circulation than does any other publication. This may be due somewhat to the fact that neither publisher nor lawyer can capably represent both sides of any controversy.

Being on the other side of the fence, mind, body, soul, and by investment, I naturally feel that you are wrong in the belief that the dehydration of foods and cabinet sanitation are arguments that are "beside the point." I maintain, with no authority on earth to prove the contrary, that the variety of foods ordinarily kept in a household refrigerator require that the air within the cabinet be conditioned in three respects. (1) temperature; (2) humidity; (3) purity—elimination of food odors, food gases, and generally unbalanced air condition.

Of course I am aware of the claim that covered dishes eliminate or minimize both mummification and flavor mingling. Actually, however, this practice greatly increases the rate of food spoilage (at any given temperature). It has been contended that the more rapid spoilage, in covered dishes, is due to the high humidity which the air acquires from the foods. I maintain, however, that it is also due, in a large measure, (especially with unsterilized fresh foods of either vegetable or animal tissues) to the absence of "breathable" air.

Anyway, we know that foods do spoil much more rapidly (at any temperature) unless all the air contacting them is "breathable," in every sense of the word, and has a favorable humidity as well as a favorable temperature.

Since only the modern ice refrigerator and melting ice can provide the latter conditions at anywhere near ideal levels, I am genuinely sincere when I say that these matters are not "beside the point."

I also feel that your suggestion that the mechanical industry offer a convertible unit is impractical. This did not work when it was tried many years ago, and will likely not work now, because the ice refrigerator is designed to speed up or encourage air circulation. The mechanical cabinet must of necessity be designed to slow down or retard air circulation. In a modern ice refrigerator melting ice balances the humidity at almost exactly the ideal degree. Therefore, the more rapidly the air is moved the more quickly foods will be cooled, the more quickly food odors and gases will be moved to the surface of the melting ice which absorbs them and takes them out through the drain. Natural laws of physics make the air within a mechanically cooled cabinet, "thirsty" or of too low a relative humidity to permit rapid circulation of the air without very quick and serious mummification or dehydration of the food stored therein, as well as an increase in the rapidity of flavor mingling.

For the reasons stated above, the convertible cabinet will be either a miserable failure when used for ice, or it will be a failure when used for mechanical cooling.

Nevertheless, I want to again congratulate you upon this editorial because it is the first writing, or oral statement, coming to my attention which indicates that some one within the mechanical industry is really trying to prevent the industry from considering beautiful and lavish ad-

vertising, memorized sales stories and slurs cast upon the ice industry as being the things needed to sell substitutes for modern ice refrigeration, in the future.

In the future FOOD PROTECTION must be sold—and it must be proven by demonstration.

With personal regards to you and to George, and sincere regrets that my late arrival at the A.S.R.E. meeting prevented my attending your wonderful party, (I have heard more favorable comment on your "festa" than any entertainment ever offered to members of the society in connection with their meetings), I am,

O. J. WILLOUGHBY,
Business Manager,
Refrigeration Publishing Co.

**Requests Permission to
Reproduce Editorial**

REFRIGERATION
Technical and Business Paper for the
Refrigerating Industries
Chicago, Ill.

Publisher:

Your editorial of June 19 places us in a position that definitely requires comment. Such comment was prepared before my departure for Chicago. I am now advised that a recent issue states that no reproduction of your editorial is agreeable with you.

We have no desire to go contrary to your wishes in this respect. For this reason I am enclosing a proof of our comment, with which we had planned to run a facsimile reproduction of your editorial. As stated in the editorial we resorted to the editorial page reproduction of your editorial only to avoid any possibility of misinterpretation.

Won't you please wire us collect, immediately, whether or not such reproduction is contrary to your wishes. We shall naturally abide by your decision.

O. J. WILLOUGHBY.

**Comment by a Publisher
May Be Challenged**

Night Press Message

O. J. Willoughby
Atlanta, Ga.

July 13, 1935.

Permission granted to publish facsimile reproduction of our editorial June 19 issue with any comment you care to make together with this message explaining our reason therefor. We have refused several previous requests to reprint in various forms because our aim and viewpoint may be misinterpreted.

Furthermore, we believe it is unfair to us as publishers since we are prepared to furnish original copies at nominal price of 10 cents each to satisfy any demand for this editorial. We believe that a trade publisher is entitled to the fruits of his labor the same as others and that free circulation of our material is a form of unfair competition.

As a responsible competitive publisher, however, you may use of the material as a basis for further original comment of your own since your publication is available to us and since we can therefore challenge any comment or use of such material.

In the case of private circulation by non-publishers who are not in a position of responsibility to the industry as a whole, such circulation of our material and comment thereon is beyond reach except by undesirable recourse to law.

F. M. Cockrell, Publisher,
Electric Refrigeration News.

**Pleased with Fairness
Of Article**

California Consumers Company
230 W. Jefferson
Los Angeles

Publisher:

Thank you very much for your letter of June 29 relative to the editorial in the June 19 issue of *ELECTRIC REFRIGERATION NEWS*.

We were so pleased with the fairness of the article that we were anxious to prepare mimeographed copies of the same and hand them to our employees. We can understand, however, your attitude that sufficient copies should be purchased to accomplish the same end.

We like the suggestions which you made in your editorial, and the industry in this section of the country, and particularly this company, will be very glad to cooperate with the electrical refrigeration industry to carry out the suggestions made.

R. M. HAGEN.

Birmingham Ice & Cold Storage Co.
Birmingham, Ala.

Publisher:

We are writing to ask your permission to reprint an editorial appearing in your June 19 issue entitled "The Ice Industry Shows Signs of Awakening." In reprinting it, we will be glad to give due credit to the publishers, if you will be good enough to give your consent.

Wm. J. RUSHTON, President.

Answer: See our reasons for objecting to reprint given above.

**Tidmarsh Says FHA
Has Helped Sales**

TUSCON, Ariz.—The Federal Housing Act has been a great help to Tidmarsh Engineering Co., Norge distributor, in increasing retail sales of refrigerators and air-conditioning equipment. T. M. Tidmarsh, president, has reported to FHA officials.

A great volume of retail refrigerator business has gone out through FHA facilities, Mr. Tidmarsh reported, and has been a factor in building sales far past their totals at this time last year.

In the air-conditioning field, fully 95 per cent of this year's installations have been made under loans made possible through FHA facilities.

**Ohio Salesmen Visit
Kelvinator Plant**

DETROIT—Fifty Kelvinator dealers and salesmen from western Ohio, who had each sold at least three Kelvinators during the month of June, were guests of the Rowlands-Halleck Co., distributor at Lima, Ohio, on a recent visit to the Kelvinator factory.

Officials of the distributing Co., who were among the group, include: W. D. Rowlands, president; K. D. Halleck, sales manager; J. P. Halleck, W. J. Meyers, J. E. Brennan, and C. D. Katterheinrich, representatives.

**50 Westinghouse Units
Ordered for Marines**

WASHINGTON, D. C.—Fifty DLF-78 Westinghouse electric refrigerators were just purchased by the United States General Schedule of Supplies for installation in the United States marine corps barracks at Quantico.

**THE PLAIN TRUTH IS ...**

Beer equipment sales are going up rapidly as a result of stabilization of the industry and the more permanent character of the license holders. The fly-by-night dispenser is dropping out - - - the experimental period is definitely over.

The proprietor of the successful drinking place knows how beer must be served to hold present patronage and attract new customers.

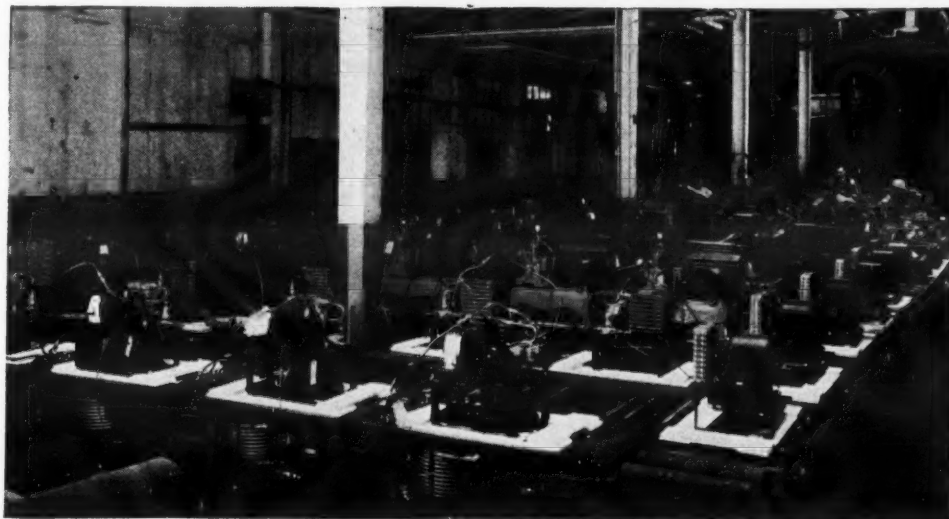
When you point out to this man just what he can accomplish by installing Temprite Coolers he has enough background to understand you. In short, he is ready to be sold.

You know the many advantages of Temprite. You know there is no other way to get the results that Temprite assures. This is your golden opportunity. Make it Pay.

TEMPRITE PRODUCTS CORPORATION

1349 EAST MILWAUKEE AVENUE
DETROIT, MICHIGAN

ORIGINATORS OF INSTANTANEOUS LIQUID COOLING DEVICES

**PERFORMANCE
IS THE STANDARD OF VALUE IN
CONDENSING UNITS****THE CYLINDER BLOCK**

MANY of the metallurgical achievements of the last two decades are incorporated in the manufacture of castings used in the Universal Cooler Condensing Units.

The cylinder block is a specially alloyed iron cast under close foundry control to meet rigidly enforced physical specifications. Uniform hardness, tensile strength, grain size and fatigue resistance are all held within close limits. Castings failing to conform with these necessary qualifications are rejected before they ever leave the foundry.

The cylinder is precision bored and finished by a modern honing operation which assures true cylindrical dimensions and perfectly smooth wall surfaces.

Cast iron of close density, properly finished, is the best bearing material known. Together with the careful fitting of pistons and close bearing tolerances used, it assures in these vital elements, high efficiency and long life.

It is well recognized throughout the industry that the Universal Cooler Condensing Unit gives maximum service regardless of the severity of service conditions.

**UNIVERSAL COOLER CORPORATION**

DETROIT, MICHIGAN

BRANTFORD, ONTARIO

MANUFACTURERS OF A COMPLETE LINE OF HOUSEHOLD AND COMMERCIAL REFRIGERATION

AIR CONDITIONING

Rowley Explains Methods of Rating Air Cleaners

TORONTO, Canada—The dust problem in air conditioning, and new investigations in methods of measuring dust and rating of air cleaning devices, were described by F. B. Rowley, director of experimental engineering laboratories, University of Minnesota, Minneapolis, at the final technical session of the A.S.H.V.E. meeting held here recently.

Dust particles will remain in suspension for periods of time, depending upon the size, density, shape, and movement of the air, said Mr. Rowley. Some of the finer dust may remain in the air for years.

Solid particles in the air are commonly classified, according to their diameters, as dust, fumes, and smoke, there being no sharp line of demarcation between these classes, Mr. Rowley declared. In general, dust ranges from the largest size particles which rapidly settle out of the air down to particles 1 micron in diameter. Fumes range from 1 to 0.1 micron, and smoke from 0.3 to 0.001 micron. (1 micron = 0.0004 in.)

Only Some Affect Lungs

"It is estimated," said the speaker, "that particles above 10 microns in diameter do not enter the human lungs and that particles below 0.5 micron in diameter will not be retained in them. Thus, insofar as damage to the lungs is concerned, only particles which are less than 10 microns in diameter are of interest. It is generally accepted that the most dangerous sizes are from 0.5 micron to 6 microns.

"Larger particles of dust, such as pollen, which range from 14 to 60 microns, may lodge in the nasal passages, causing an irritation known as hayfever or asthma, but they do not enter the lungs."

Why Dust Is a Problem

Some of the reasons for dust presenting a difficult phase of the ventilation problem are:

- (1) It is so common, practically no air being free from it.
- (2) The great majority of the particles are invisible and their presence is not apparent by a casual observation.
- (3) No satisfactory method of measuring the dust in the air has been standardized and accepted.
- (4) The performance to be expected of different types of cleaning apparatus is uncertain, due largely to the lack of standardized methods of measurement.

Measurements of Dust

"Many measurements have been made to determine the number of dust particles in the atmosphere, both in various types of buildings and out-of-doors," according to Mr. Rowley. "These counts range anywhere from a few hundred up to several hundred million particles per cu. ft.

"After the air has been washed by a snow storm or rain, the count may be a matter of a few hundred, while for a reasonably dry day on a busy street it may run from four to six million particles per cu. ft. Thus, the

number of dust particles may vary within wide limits, and it is difficult to set standards as to the amount which should be tolerated.

"A standardized method of measuring dust is an important factor which as yet has not been settled. Several methods have been proposed and developed, although none has shown sufficient merit to warrant its being universally adopted.

Count by Microscope

"A general method which seems to give greatest promise from the standpoint of practical application is to separate the dust particles from a given quantity of air and make an actual count of them under the microscope. In addition to giving the number of particles present, some information may be obtained as to the relative sizes and shapes of the particles.

"There are several possible methods of separating dust particles from the air, but the two which seem most practical and which have been used in this investigation are:

"(1) To wash the dust out with water.

"(2) To collect it on a viscous coated glass plate."

Mr. Rowley stated that the viscous coated impinger principle is used in several instruments, a very common one being that designed by Dr. E. V. Hill. In this instrument, a high velocity jet of air is impinged against a viscous coated glass by the rapid stroke of an air pump. The particles are then counted under a microscope, as in the previous case. The advantages of this system are that the sample is quickly taken and the apparatus is easily handled for practical measurements.

Improvements in Counter

The Hill dust counter was selected as a basis for the first experimental work which Mr. Rowley conducted. In this work, three general changes were considered for improving the percentage of dust collected:

(1) To select the adhesive material for coating the glass collecting plate which would collect the largest percentage of dust and retain the dust in the best condition for counting under the microscope.

(2) To change the size and shape of the orifice and vary its distance from the viscous plate to get the most effective design for collecting a high percentage of dust which would fall within the field of the microscope for counting.

(3) To find the most effective velocity of air through the orifice and to devise a means for obtaining a constant uniform velocity of air for the sample.

Change in Orifice

After many trials, a filter oil was selected as the most satisfactory.

In changing the orifice, the object was to select the combination of orifice design and position of orifice relative to the plate which would give the most efficient dust collection, and a sample of such size and shape that

all or a definite percentage could be brought within the field of the microscope for counting at the desired magnification.

A cylindrical orifice 0.04 in. in diameter through a 1/8-in. plate with 1/16-in. clearance was finally selected.

Drawn at Constant Velocity

Air was drawn at constant velocity through the orifice by means of a small vacuum pump. The rate of air flow giving the best collection of dust was determined by trial. While this method was an improvement, points out Mr. Rowley, it was still difficult to get samples of air which were sufficiently small to make the counting practical. The dust samples were concentrated in the central part of the field while the outer portions were practically clear.

In its present form, said the speaker, the counter is designed so that the air is drawn through the orifice at a constant velocity by means of a vacuum impinging on a viscous coated glass plate. The amount of air striking the plate at any given section is regulated partly by the size of the orifice and the air velocity through the orifice, but finally by moving the orifice parallel to the surface of the collecting plate at a predetermined constant velocity.

Uniform Path on Plate

By this arrangement, a continuous uniform path of dust particles is deposited on the plate. The width of the path is within the field of the microscope and by counting the particles for a given length of the dust path, the number per given air volume is determined.

The instrument in its present form as described by Mr. Rowley is provided with an 0.04 in. diameter orifice through an 1/8 in. thick plate. The plate is placed 1/16 in. from the viscous coated glass slide.

For best results, the air is drawn through the orifice by a vacuum equal to 5 in. of mercury, and for average laboratory air a countable sample can be obtained by moving the orifice over the surface of the glass at the rate of 1/4 to 1/2 in. per second. This gives a volume of air of approximately 0.6 cu. in. per millimeter of length for the dust path and a velocity through the orifice of 375 fps. Counts are taken for different sections of the path to give a fair average for the sample.

Counts for the first sample showed an average of 1,293,000 particles per cu. ft., and for the second sample, an average of 1,865,000 particles per cu. ft.

In later experiments it was shown that during a snowstorm the count was reduced 50 per cent or better, being 612,000, and that when taken while a janitor was sweeping, showed an increase to 2,010,000.

Why Rating Is Problem

According to Mr. Rowley, the rating of dust cleaning apparatus has always been a troublesome problem, largely due to the fact that no standard method has ever been adopted for measuring the amount of dust in the air. For several years, a committee of the American Society of Heating and Ventilating Engineers worked on the problem and, after considering the various methods available for measuring dust, finally prepared the A.S.H.V.E. Standard Code for Testing and Rating Air Cleaning Devices Used in General Ventilation Work in which a given kind of dust was used and the percentage of total weight retained by the filter taken as a measure of its efficiency.

The dust prescribed in this code consists of a mixture of 50 per cent by weight of powdered lamp black and 50 per cent by weight of ashes of Pocahontas bituminous coal screened to pass the 200-mesh sieve. Since the code is for the purpose of determining the dust-holding capacity of the filter as well as its efficiency or arrestance, it must necessarily provide an accelerated test. 0.65 grams of dust per 1,000 cu. ft. of air are therefore prescribed.

Dust Fed into Air

The mixture of dust is fed into the air by a specially designed dust mixer and the amount passing through the filter is obtainable by thoroughly cleaning a certain fraction of the air passing through and weighing the dust thus obtained.

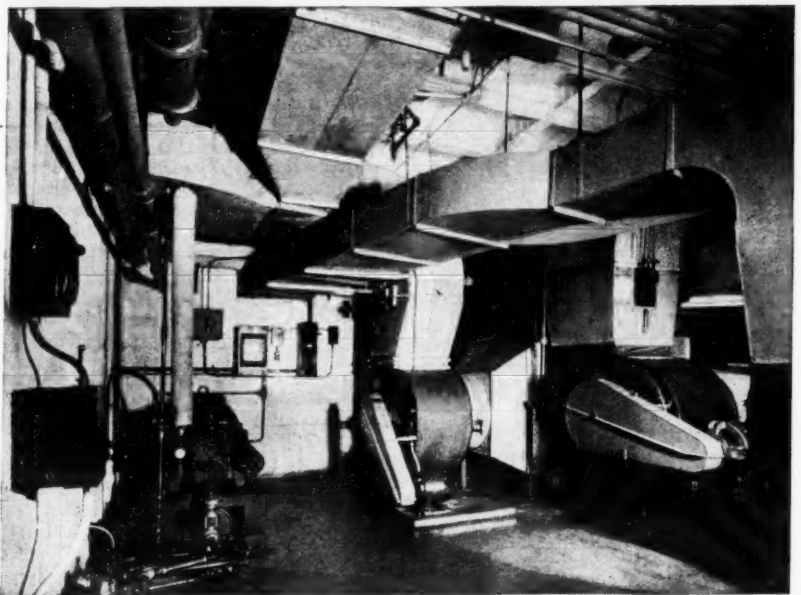
"There is a question as to whether the particular dust prescribed, together with the method of feeding it in concentrated form to the filter, represents practical conditions," Mr. Rowley said.

"These dust particles may have a tendency to remain in agglomerated masses and not to separate out into individual, fine particles as they would in practice. If this should be the case, certain types of filters might collect a much larger percentage of the weight of dust in the air during a performance test than they would during practical operations.

"On the other hand, there may be the question of overloading certain viscous types of filters and not giving the oil-coated fibers the same chance of collecting the dust that they would have in normal operation.

"Next, there is the question that

So the Patrons May Eat in Comfort



Kroeschell Engineering Co. of Chicago installed this air-conditioning system for Huyler's restaurant. Westinghouse condensing units are used.

Chicago Restaurant Installs New System

CHICAGO — Huyler's restaurant, located in the Palmolive building on North Michigan Ave., in the center of Chicago's smart shopping section, has recently put into operation a year-around system of air conditioning for the comfort of its luncheon, tea, and dinner guests. The system was designed and installed by Kroeschell Engineering Co.

The air conditioner, specially designed for heating and cooling, is located in the basement, together with a Westinghouse refrigerating unit which provides cooling during summer months. A duct system conveys conditioned air to the supply grilles located near the ceiling of the restaurant's Avenue Shop and Blossom Room.

Huyler's reports a substantial increase in patronage since the system has been in use.

the standard code. It seems reasonable to believe that this difference is partly due to the fact that the filter is more efficient for large than for small particles.

The number of particles counted in any case will depend upon the magnification. For a magnification of 100 diameters, particles of 1 micron are easily counted, and a study under different magnifications indicates that on the viscous coated slides particles of 1/2 micron in diameter may be included. This varies with the individual making the count, but as a lower limit it appears that particles 1/2 micron in diameter may be included. At 50 diameters magnification the same study indicated that particles 1 micron in diameter may be included.

"From the results obtained in the investigation," declared Mr. Rowley, "it would seem reasonable to give some consideration to the standard method of testing air filters to see whether or not the code provides everything that is required of a filter in normal operation.

"The important factor in rating a filter is often not that it takes out a certain percentage of dust by weight, but rather that it will take out certain objectionable dusts. In some cases, it may be the very fine dust and, in other cases, it may be the coarser particles that should be removed. The efficiency of a filter rated on the weight basis might have no relation to its efficiency when rated by the dust particles as found in normal air."



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Makers of the World's Best-Known V-Belts

THE L. H. GILMER COMPANY, Tacony, Phila., Pa.

SPECIALISTS IN QUALITY BELTS SINCE 1903

IT PAYS TO SAY "SYLPHON"

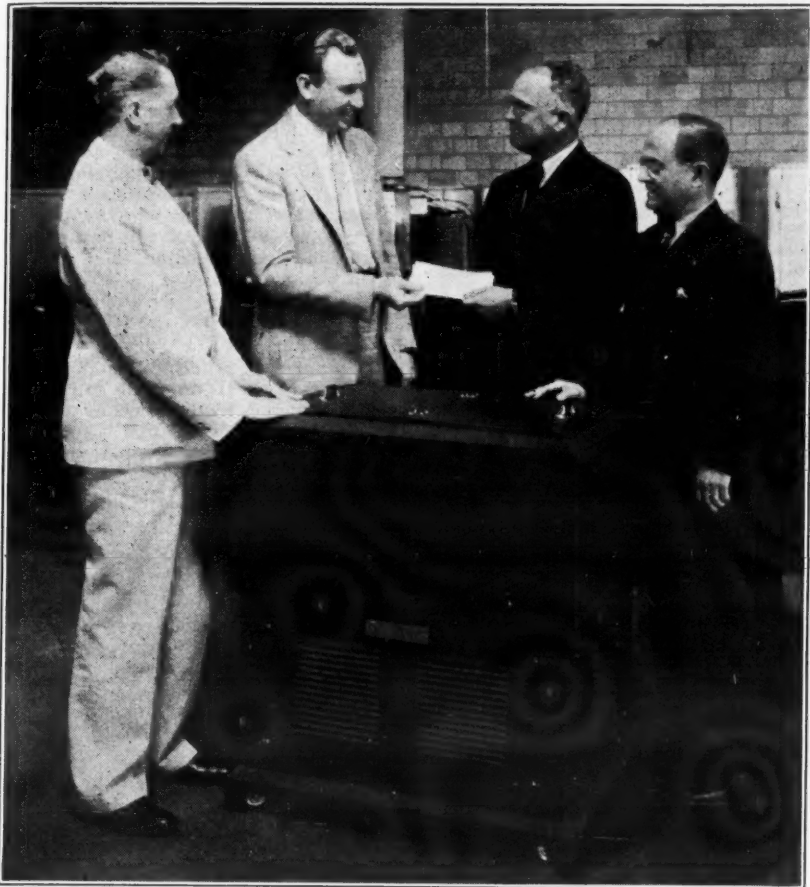
A Sylphon Bellows is not just another metal diaphragm. Originated and pioneered by this company 35 years ago, this little seamless, jointless "miracle in metal" has been the subject of more research and development than has any other product of its kind in existence.

By virtue of this fact, the Fulton Sylphon Company offers you, not only the most dependable product which many years of intensive specialization can produce, but in addition, they offer you the benefits of their unparalleled experience in the correct application of Sylphon Bellows and thermostat assemblies to insure long, trouble-free service. Avail yourself of this plus value that costs you nothing.

FULTON SYLPHON CO.
KNOXVILLE, TENN.

SEAMLESS
METAL BELLOWS AND
THERMOSTAT ASSEMBLIES

Cold Drinks for Automobile Travelers



Six carloads of Kelvinator beverage coolers for the Standard Oil Co. of Indiana are represented in the order which H. W. Burritt (third from left), Kelvinator vice president in charge of sales, is shown receiving from R. J. Scheu of the national direct sales division at Chicago, who made the sale. At the left is J. A. Harlan, commercial sales manager. S. V. Altmont, manager of the liquid cooling division, is at the right.

Miss Swann Directs Food Experiments

NEWARK—Ada Bessie Swann, former director of home service for Public Service Electric & Gas Co. of New Jersey, and founder of the department, here, has been appointed director of the Food and Equipment Experimental Center of the *Woman's Home Companion*.

Miss Swann acted as first chairman of the home service committee of the American Gas Association on the formation of that committee.

In her former position, Miss Swann guided the activities of a highly trained staff of home economics workers, compiled recipe books, and prepared manuals on gas ranges, water heaters, etc.

While acting as home service director of Public Service, Miss Swann advised thousands of radio listeners on correct home management.

Erskine-Healy Urges Use of Recipe Books by Dealers

ROCHESTER, N. Y.—Erskine-Healy, Inc., Crosley distributor here, is promoting sales of Crosley Shelvador electric refrigerators by urging dealers to use Crosley recipe books as prospect-getters.

In a bulletin recently released, dealers are challenged: "Would you pay 2½ cents for a Crosley prospect?" The plan is for the dealers to purchase a quantity of these recipe books for free distribution in their territories. All women, it contends, are interested in keeping posted on up-to-date desserts and unusual menus to serve their families, bridge, or dinner guests.

It is suggested that dealers tie up this promotional feature with their newspaper advertising and showroom window displays, using to attract attention, these advertisement lines: "Serve colored ice cubes and make your party different. Free copy of Crosley recipe book tells you how to make them." Or, "Come in and get a copy of the Crosley recipe book."

Economical Assembly

ACE HARD RUBBER DOORS, RAILS, JAMBS and other parts are so well standardized in all dimensions that their use guarantees important labor economies in assembling into Display Refrigeration Equipment.

Our complete catalogue which we will send for the asking proves the simplicity with which our products may be incorporated in your structural plans.

Write to

AMERICAN HARD RUBBER CO.
11 MERCER STREET, NEW YORK, N. Y.
Akron, O. • 111 W. Washington St., Chicago

Belsey to Build 15 G-E 'New American' Homes in California

LOS ANGELES—Ground was broken recently for the first of the "New American" homes to be erected in Southern California in connection with the General Electric "New American" Demonstration Home Building Program under the sponsorship of the George Belsey Co., General Electric distributor here.

The home is located just off the main artery through Westwood, a Los Angeles suburb built around the University of California at Los Angeles.

Other homes of this type will be built here in Glendale, San Marino, Santa Ana, Newport Beach, Santa Barbara, San Bernardino, Riverside, and other Southern California cities.

The distributor expects to have 12 or 15 homes located in selected towns and districts in the Southern California area. Officials stated the opinion that "they will all be so carefully spotted that they will be as valuable as twice that many homes in less strategic locations."

Los Angeles men present at the official ground breaking for the new home included:

Walter Braunschweiger, president of the Los Angeles Chamber of Commerce; Fred Todt, manager of the General Electric Supply Corp.; H. Roy Kelley, member of the Jury of Awards, "New American" Home Architectural Competition; Dr. Edwin Janss, Janss Investment Corp., developer of Westwood; Fred F. Marlow, regional director, F. H. A. for Southern California; George Belsey, George Belsey Co., G-E distributor; Arthur R. Hutcheson, Los Angeles architect, designer of "New American" home, and winner of the national award; George M. Holstein, Jr., builder of the home.

Edwina Nolan Directs School Which Grocers Association and Utility Sponsor in Fall River

FALL RIVER, Mass.—The Fall River Electric Light Co., in conjunction with the Fall River Grocers Association, recently conducted a co-operative cooking school without the usual door prizes, novelties, and samples. About 5,600 people attended the four-day school, which included eight sessions.

The school was under the direction of Edwina Nolan, director of the home economics department of the General Electric Co., assisted by Lillian T. LeClair, home economist for the Fall River Electric Light Co. Eight girls from the home economics class of the B.M.C. Durfee High School also assisted.

At the last session of the series, a General Electric Balltop refrigerator and an order for a month's supply of groceries were given away as grand prizes.

In the past, says Harry W. Hale, sales manager of the utility, grocers of Fall River had tied in with the local cooking schools, but due to the variety of products on display, the grocers never had a real chance to show the public their foods and staple goods. This cooking school plan included the use of grocers' advertised recipes and foods supplied directly from their stores.

Each grocer in the association decorated his store with colored paper banners and display cards announcing the cooking school. In each of the 182 stores, tickets to the cooking school were available to customers. Every ticket had a stub attached with a place for the user's name and address and the name of the grocer who issued the ticket. Prizes were offered to the grocers who had the most customers present at the cooking school.

Printed programs were distributed

containing the recipes and list of products used at each session. On the back of each program was a list of manufacturers whose products were used during the cooking school.

Advertising the school were two display windows in the Fall River Electric Light Co. building. One window was devoted to a display of manufacturers cooperating with grocers. The other was used by a local lumber dealer with a display showing the possibilities of kitchen planning. The exhibit included a model electric kitchen.

582 Electrolux Units on Hornell, N.Y. Gas Lines

HORNELL, N. Y.—Installation of 582 Electrolux refrigerators on the town's gas lines up to May 1, 1935, is the record of the Hornell Gas Light Co., here. Twenty-one of the sales were made during April of this year.

An additional seven refrigerators were sold the first three days of May by the two full-time men on the sales force.

Cliff Electric in Miami To Handle Crosleys

MIAMI—Cliff Electric Co., Inc., new retail store handling electric appliances, will sell Crosley electric refrigerators, it is reported.

Fred Cliff, president of the concern, has been identified with the electric appliance and automobile business in this city during the 10 years which he has resided here. G. F. Roberts is secretary and treasurer of the organization.

Leonard Gives Recipes For 125 Dishes in New Booklet

DETROIT—Titled "Delightful Dishes from Your Leonard," the recipe book recently published by the Leonard Refrigerator Co., contains more than 125 recipes of food dishes that can be made in the home.

This 48-page booklet, written by Mary Lee Gordan, Leonard home economist, is attractively prepared. Cover is done in four colors—the design being set off against glossy black.

Among the subjects covered in the recipe section are entrees, main dishes, vegetables, salads, desserts (frozen and general) beverages, sandwiches, and miscellaneous recipes for special occasions, such as buffet lunches, teas, late suppers, and bridge luncheons.

In one section of the book helpful household hints and correct measures in cooking are thoroughly treated. It also contains suggestions for preparing quantities of food for large meals, banquets, and the like. Estimated quantities are given for serving as many as 50 at one time.

A chart containing menus for every day of the week, with references to the recipes represented on these menus indexed, is another feature.

Included in this booklet, also, is interesting data on the Leonard electric refrigerator, including proper food arrangements in the cabinet, and complete rules for the preparation of frozen desserts.

Doeffler Opens Third Store Selling Kelvinators

CINCINNATI—New dealer for Kelvinator refrigerators is the Doeffler Electric Co.'s newly opened branch at 138 East Fourth St. here, reports Carl E. Haller, merchandising manager of the Graybar Electric Co. of this city.

Two other stores operated by this company handle Kelvinators.

California Women Study Frozen Desserts

REEDLEY, Calif.—Members of the Home Department, local women's organization here, studied the making of frozen delicacies in electric refrigerators, ice boxes, and the old-fashioned freezer at a recent picnic meeting. Miss Katherine Bennett, home economist, demonstrated the preparation of the frozen desserts.

Hecht's Converts Branch into Kelvinator Store

BALTIMORE—Hecht's Reliable Stores has converted its Eastern Ave. branch into a Kelvinator refrigerator store, which will be operated under a Kelvinator-trained sales crew. Hecht's main establishment features leading makes of refrigerators in its refrigerator department there.



Smooth

RUNNING

REMINISCENT of the fleet, velvet-footed antelope! Brunner refrigeration units, intelligently engineered for smoothness of operation, naturally embody the counterpart of this advantage, namely, minimum frictional losses through wear. In other words, Brunner's smoothness means enhanced refrigerating efficiency and negligible repairs in years to come.

The 1935 Brunner line, marked by large size compressors, Silver Domes (scientifically finned cylinder heads) and other improvements, offer you a dependable answer to compressor and highside problems. Eight models of dependable compressors, 41 efficient highsides—air and water cooled units—gasoline engine or electric—in a range from 1/6 H. P. to 15 H. P. May we send you our new catalog with full data and specifications? Write: Brunner Manufacturing Co., Utica, N. Y., U. S. A.



The Brunner Commercial Model; Dependable—Carefree—Economical. Two cylinders. Air or water cooled. In a range from 1/4 H. P. to 2 H. P.

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ENGINEERING

Whitman Outlines Processes In Heat Transfer

By Prof. Walter G. Whitman*

The transfer of material and the transfer of heat from one phase to another are probably the most universal engineering problems encountered in chemical industry. Heat transfer has been extensively investigated during the past 15 years, and fair progress has been made in the study of certain fields of material transfer, such as distillation, evaporation, and absorption.

Several investigators have pointed out that interaction between phases is governed by a few basic principles, and have partially developed the mathematical treatment of the general case. The purpose of this paper is to outline in a qualitative way the nature of the exchange between phases and to emphasize the wide applicability of a comparatively simple concept to a variety of problems which are nominally dissimilar.

Diffusion Plays Major Role

The rate at which a process can be carried out naturally has considerable economic significance, since it affects equipment and operating expense and usually influences process efficiency. With few exceptions, the factors controlling rate in chemical operations are not chemical in nature—chemical reactions in a single phase are frequently instantaneous by comparison with the rate secured on the overall operation. In most cases the purely physical problem of transfer from one phase to another will be found to be the limiting factor.

This paper is titled "Diffusional Processes" because diffusion plays a major role in interaction between phases. The term "diffusion" in its scientific sense is restricted to mole-

cular movement in a single phase without the aid of convection currents. Now at the boundary of any fluid there exists a thin film in which mass movement occurs significantly only in planes parallel to the surface. Because of the absence of appreciable mass flow perpendicular to the surface, material can move through this film to the surface only by true diffusion and it is therefore often called a "stagnant" film because it offers the same resistance to the passage of material to the surface as would exist if there were no mass movement in any direction.

Films Have Thicknesses

Such films have thicknesses, which under conditions usually encountered, may vary from .001 cm. up to 0.5 cm., dependent principally upon viscosity and density and the turbulence of the fluid adjacent to the film.

If mixing within the main body of a fluid were so rapid that the fluid was substantially uniform in composition except for the surface film, the problem of estimating material transfer between two fluid phases would reduce solely to a consideration of true diffusion through the surface film at the boundaries of each fluid.

Some of the early investigators assumed this to be the case, but more recent work shows that concentrations in the main fluid body are seldom substantially uniform and that a sound quantitative treatment must allow for the variations. This is accomplished by introducing the term "eddy diffusion" to indicate transfer up to the true surface film by turbulent mixing, designating movement through the film itself as "laminar diffusion."

"Eddy Diffusion"

It is evident that "eddy diffusion" is not a scientifically correct use of the word "diffusion," but it is justified as an engineering description of the process by the fact that it closely resembles and is associated with true diffusion through the surface film.

Investigations are in progress to give a clearer picture of "eddy diffusion" and of its relative importance in the transfer of material under specific conditions.

The recognition of eddy diffusion as a significant factor has greatly clarified the correlation of diffusion phenomena with heat transfer and with fluid friction. The earlier erroneous concept that true diffusion through the laminar film was the only factor of importance led to the conclusion that heat transfer and diffusion could be computed interchangeably merely by substituting the heat conductivity of the film for its diffusivity, or vice versa, since the film thickness would be the same in both cases.

Correlating Two Types of Transfer

While this procedure permitted fair correlation in many instances, we now realize that the mathematical treatment is somewhat more complicated because eddy diffusion is not dependent on the diffusivity, and the corresponding transfer of heat by convection is probably not a function of the thermal conductivity of the fluid. A definite improvement in correlating material transfer with heat transfer has resulted from the inclusion of eddy diffusion in the picture.

The movement of material from one fluid phase to its boundary is governed by factors which may be simply expressed by the statement:

Rate of transfer per unit is proportional to the potential difference between the main fluid and its surface.

"Potential Difference"

This potential difference is conventionally expressed as a difference in partial pressures when the phase is gaseous and as a difference of concentrations when it is liquid. Thus, for diffusion to the boundary surface of a gas

Rate per unit area = $k_g(P_g - P_i)$ and for diffusion to the boundary of a liquid

Rate per unit area = $k_L(C_L - C_i)$ Where k_g and k_L represent proportionality factors for gas and liquid diffusion respectively, P_g and C_L are pressure or concentration in the main fluid body, and P_i and C_i are pressure or concentration at the interfacial boundary.

The proportionality factors, k_g and k_L , are not constants, but vary with the dynamic conditions of the system and with the physical properties of the components. It will perhaps be easiest to explain their characteristics by first outlining the earlier concepts and then indicating how these have been modified by further investigation. For this purpose, the discussion will be restricted to k_g , with the understanding that similar treatment applies to k_L .

The factor k_g was formerly considered to represent a true diffusion coefficient through a film of thickness X . It, therefore, varied inversely with the film thickness, which was a function of velocity, viscosity and density, and directly with the true diffusivity of the material through the gas.

"Effective Film Thickness"

It was accordingly logical to calculate an "effective film thickness" which would offer the same resistance to diffusion as that actually encountered in the system, by dividing k_g by the specific diffusion constant per unit of film thickness.

"Effective film thicknesses" determined for one set of conditions, for example, the absorption of hydrochloric acid, could then be used if another material such as sulphur dioxide were substituted in the same apparatus with the dynamic conditions. The coefficient k_g would be changed only in proportion to the specific diffusion constant of sulphur dioxide as compared to that of hydrochloric acid. Data on specific rates of diffusion (per unit thickness of film) were meager but they were assumed to be constant when diffusion was calculated in mols.

New Research Alters Views

Present views modify the earlier picture in two significant respects. From theoretical considerations, supported by experimental data, it appears that the rate is affected by the partial pressure of the constituent which is not being transferred, i.e., the "inert" or "carrier," this effect being an inverse proportionality. Thus, the equation should be written:

$$\text{Rate per unit area} = \frac{k_g}{P_B} (P_g - P_i)$$

where P_B is the pressure of the inert component, B .

In many instances P_B is substantially constant and can therefore be included in the proportionality factor, as was done in the earlier formulation; for example, when the component which is being transferred is in dilute concentration and the total pressure is constant. In other cases P_B varies considerably and its effect cannot be disregarded.

The other major modification is the appreciation of eddy diffusion as a factor. It is still useful to compute "effective film thicknesses" but we now realize that only a part of this theoretical film corresponds to the resistance of the laminar layer, the remainder being equivalent to the eddy phenomena which are not diffusional in nature and therefore should not be expected to follow the same law.

Applications

The ubiquity of transfer between phases as a chemical engineering problem can perhaps best be emphasized by considering some of its important manifestations. Reactions between gas and liquid are possibly the most widely encountered and will therefore have first consideration.

Gas-Liquid

Absorption, the process of absorbing some component or components from a gas by a liquid and the reverse process of desorption, has historically furnished the strongest incentive to quantitative study of transfer between phases.

The material must pass through two films in series, one on the gas side of the boundary and one on the liquid side, and either one may have a negligible significance in comparison with the other. (As the boundary itself, the concentrations in the liquid and gas at the plane of contact are assumed to be in equilibrium.)

Thus the absorption of a very soluble gas, such as hydrochloric in water, is controlled by its ability to work its way from the main body of gas to the liquid surface, while the absorption of a gas of low solubility, such as oxygen in water, is fixed by its ability to get from the surface of the liquid into the main body of liquid.

From this it is evident that an efficient device for absorbing a soluble gas might be relatively poor if used for one of low solubility. The desired action in the first case, securing low gas film resistance, is of no importance in the second instance,

where the liquid behavior is all-important. The present state of knowledge allows predictions of fair engineering accuracy on the performance to be expected from a given type of absorber if its operating conditions are modified or if a different solute or liquid is employed.

Complicated cases such as the simultaneous absorption of several components from a rich gas offer difficulties in quantitative treatment, but dilute gases or the absorption of single components are readily susceptible to analysis.

Humidification and dehumidification involve the same principle of absorption, with the important addition of heat transfer between gas and liquid. The long-accepted rule in psychrometry that wet-bulb temperatures are synonymous with the temperature of complete saturation when air is adiabatically humidified has recently been disproven both by experiment and by theory.

While the discrepancy is usually small in the air-water system, it can be shown that this is fortuitous and that large differences exist in the case of other liquids.

Humidification an Example

Evaporation of a single liquid into a gas stream is a general case, of which humidification of air by water is a specific example. Drying is, under certain conditions, a similar manifestation when the surface is completely covered by liquid, although as drying proceeds, other factors such as diffusion of liquid to the surface of the solid assume controlling importance.

An interesting example of the effect of diffusion is illustrated by the evaporation of constant boiling mixture into air. This mixture could be vaporized by boiling without any change in the composition of the remaining liquid. When it is vaporized by an air stream passing over the surface; however, the component having the higher diffusion rate escapes more rapidly and the remaining solution becomes steadily weaker in this component.

Rectification

Rectification is a process of interchange between vapor and liquid usually carried out in bubble plate towers, which has generally been handled by computing the theoretical number of plates required if equilibrium were established on each plate. By comparing the theoretical with the actual number of plates employed a figure called "overall plate efficiency" is a rough measure of the diffusion between phases and might well be expected to vary with the components of the system as well as with operating conditions.

A method proposed by Murphree for treating rectification as merely another instance of diffusion leads to an "individual plate efficiency" which is on a sounder basis than the above "overall plate efficiency" and relates it directly to absorption coefficients.

Condensation

Condensation of mixed vapors, widely encountered in petroleum distillation, is basically a problem of diffusion since the less volatile components must diffuse through a film of the more volatile in order to reach the cool condensing surface. The quantitative treatment of this phenomenon is complicated although the principles involved are quite simple.

Diffusion is often the controlling factor in chemical reactions between gas and liquid. It is well recognized, for example, that gum formation in gasoline by oxidation occurs much more slowly in large storage tanks than in smaller vessels. This is due to the lower rate of oxygen absorption (per unit volume of gasoline) in the large tank rather than to any inherent difference in the rate of the chemical reaction itself.

Liquid phase hydrogenation by gaseous hydrogen is another example, where it has been shown that the physical rate of absorbing hydrogen in many instances is the limiting factor on the speed of hydrogenation.

Liquid-Liquid

The most common illustration of diffusion phenomena in reactions between non-miscible liquids is in extraction from one liquid into another. The current interest in solvent-refining lubricating oils emphasizes this case.

While adequate data on rates are not available, it is reasonable to expect that the dynamic factors of viscosity, density, and turbulence, and the diffusion characteristics of the components involved are the primary variables and that the quantitative treatment will parallel that for gas absorption.

Gas-Solid

Combustion reactions such as the burning of coal and the production of water gas from coke are largely influenced by diffusional processes—in fact the speed of the chemical reactions is so great at the high temperature that the rate is determined by the slower physical processes of diffusion.

Treatment of gases by solids, as in adsorption of natural gasoline from gas by charcoal and drying of gases by means of silica gel, are other examples. Many cases of catalysis of gaseous reactions by solids are probably limited as to rate by diffusion of the reactants through a gas film to the catalyst surface and diffusion of the products back through the same film.

Liquid-Solid

The dissolving and leaching of solids furnish countless illustrations of the controlling effect of diffusion through the fluid film adjacent to the surface. Decolorizing and other adsorbing operations with earths, chars, and the like are similarly governed by physical transfer.

Electrochemistry affords interesting examples of diffusion when current densities must be kept below the limit where diffusion of ions through the liquid film adjacent to the electrode cannot maintain the ionic concentration required at the electrode surface. The use of rotating electrodes to thin down the surface film and thereby increase diffusion permits considerably greater current densities.

These numerous illustrations of diffusion are intended to emphasize the wide application in industrial processes. The chemist and the chemical engineer encounter diffusion in so many varied forms that they often fail to recognize existence as a dominant factor in their problem.

Little has been said here of the quantitative correlation of diffusion phenomena and, although mathematical treatment is purposely avoided, it may be pertinent to mention certain basic relationships. Diffusion is most easily visualized by the concept of the "effective film thickness" and the specific diffusivity of the material in a given system.

The "effective film thickness" is determined primarily by the turbulence of the main body of fluid adjacent to the film, which in turn is a function of the Reynolds number involving dimensions of the system, velocity, density, and viscosity. The factors determining the specific diffusivity of the material in the system under consideration are not fully understood, but fortunately the range over which molal diffusivities in gases vary is not great and the same holds true for diffusivities in liquids. "Eddy diffusion" and the corresponding movement of heat by turbulent mixing call for considerable further investigation.

"Effective film thicknesses" have been determined for certain typical cases; specific diffusivities can be estimated with fair engineering accuracy. It therefore becomes possible to approximate the overall diffusion rates which may be anticipated under definite conditions and thereby to determine the general magnitude of the diffusion effect and to evaluate its importance in specific cases.

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COMMERCIAL REFRIGERATION

Fundamental Factors in Determining Heat Load

Fundamental considerations and factors involved in the determination of heat loads in commercial refrigerators are given in a manual which McCray Refrigerator Sales Corp. developed for the guidance of its dealers in commercial refrigerators and commercial refrigerating machines.

The quantity of heat which will pass through any wall, says the manual, is principally dependent upon three things:

1. Nature of materials contained in the wall; 2. Quantity of these materials; 3. Temperature difference between the two sides of the wall.

It has been experimentally proven that each separate material under the same conditions will allow a fixed and definite amount of heat to pass through it. The amount of heat that will pass through a high-grade, pure corkboard slab, 12 in. wide x 12 in. long (1 sq. ft. of area) x 1 in. thick is about .285 B.t.u.'s per degree difference in temperature between the two sides of the slab per hour.

In this example, corkboard is the material; the 1 in. thickness is the quantity; and the 1° is the temperature difference between the two sides of the slab.

Consider the cork in a 5-in. standard McCray wall of a no-glass, porcelain exterior cooler to be 3 in. thick, the cooler temperature to be 35° and the room 85°. (Porcelain offers very little resistance to heat flow so the entire 3-in. thickness may be considered as corkboard only.)

Since all the insulating material used in the McCray model is corkboard, this will be the only factor to enter into the material column of Table 1. Quantity of corkboard in this example is 3 in. thick. The temperature difference between the two sides of this 5-in. wall is 50°.

(1) Material—Corkboard.
(2) Quantity of Material—3 in.
(3) Temperature Difference Between Two Sides of Wall—Room temperature, 85°; cooler temperature, 35°; difference, 50°.

Since the quantity of heat that will pass through any wall is inversely proportional to the thickness of the wall, the factor (.285 B.t.u.'s per sq. ft. degree difference in temperature per inch of thickness per hour) must be divided by the thickness of the wall in inches of cork.

The complete hourly heat leak for every square foot of outside corkboard insulated surface of this cooler wall is therefore calculated as follows:

.285 (B.t.u./sq. ft./deg./inch/hour) × 50° = 4.75 B.t.u./sq. ft./hour ÷ 3 (thickness of corkboard in inches). Then: 4.75 B.t.u./hour × 24 hours

= 114.0 B.t.u. per sq. ft./day.

If it is found that the outside surface of this cooler wall is 500 sq. ft., the total heat leaking into the cooler every day becomes 114.0 B.t.u.'s per sq. ft. per day × 500 sq. ft. = 57,000 B.t.u.'s per day.

It must be understood, however, that this heat leak is that which passes through the insulation only. Coils and compressor equipment specified on this heat leak only, will be under-estimated inasmuch as heat entrance through service operations of door openings, interior lights, stocking with warm foods, etc., has not been considered.

It is therefore imperative that the "heat leak" only be increased by an amount that will include all of the above service loads.

Laboratory experiments as well as actual working conditions have shown that this added heat load may be included in a service factor. This service factor for a 3-in. corkboard insulated, 5-in. wall, with average service conditions has been determined to be approximately 35% per cent.

The total heat load on this cooler then becomes a sum of:

1. The wall heat leakage.
2. The service heat load.

Then: 57,000 B.t.u.'s per day + 35% per cent of 57,000 = 77,280 B.t.u.'s per day.

The other remaining method of using this service factor is to include it with the heat leak factor, the sum of these two factors constituting the "total heat load factor."

Total heat load factor in this example is calculated in the following manner:

114 B.t.u./sq. ft./day (heat leak factor for 50° difference) + 35% per cent of 114 (service factor) = 155.0 B.t.u./sq. ft./day. (Shown in Table 1.) This is the total heat load factor.

Total amount of heat entering this cooler in one day is then again obtained as follows:

155.0 B.t.u./sq. ft./day × 500 sq. ft. = 77,280 B.t.u./day.

The following examples show two actual determinations of total heat loads by the use of the tables.

Total outside area of a cooler equals:

(Two ends) 8 × 9½ × 2 = 149 sq. ft.

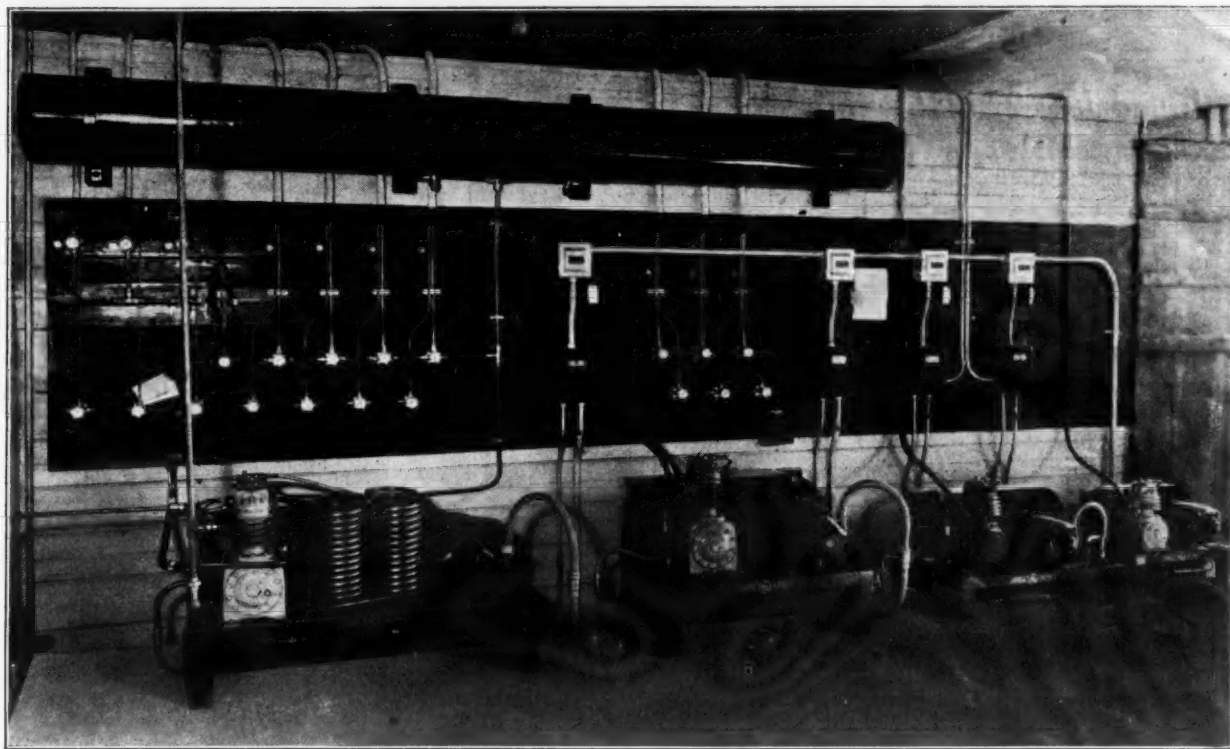
(Top and bottom) 6 × 8 × 2 = 96 sq. ft.

Total Outside Surface = 357 sq. ft.

Total Outside Glass Area = 8.8 sq. ft.

Total outside area—357 sq. ft. Total glass area—8.8 sq. ft. Total outside corkboard area—348.2 sq. ft. Corkboard thickness—3 in. Plates of glass—3. Temperature difference—55° F. Total heat load factor for cork—

Battery of G-E Units Serve Boston Hospital



Battery of four General Electric condensing units, part of the G-E refrigeration equipment installed in Peter Bent Brigham hospital, Boston. Note the neatly arranged control and valve panel and individual refrigerant lines.

171.0 B.t.u. per sq. ft. per day. Total heat load factor for glass—500 B.t.u. per sq. ft. per day.

Then: 348.2 sq. ft. × 171 B.t.u./sq. ft./day = 59,512.2 B.t.u./day (cork).

8.8 sq. ft. × 500 B.t.u./sq. ft./day = 4,400.0 B.t.u./day (glass).

Total heat load with average service = 63,912.2 B.t.u./day.

Total outside area of case equals:

(Front and back) 10 × 2½ × 2 = 46.6 sq. ft.

(Two ends) 2½ × 2-5/8 × 2 = 13.25 sq. ft.

(Top) 1½ × 10 = 12.5 sq. ft.

(Bottom) 10 × 2-5/8 = 28.35 sq. ft.

Total Outside Surface = 100.7 sq. ft.

Total Outside Glass Area = 16.2 sq. ft.

Total glass area—16.2. Total outside corkboard area—84.5. Corkboard thickness—3 in. Plates of glass—3. Temperature difference—50°.

Total heat load factor for cork—155.0 B.t.u. per sq. ft. per day. Total heat load factor for glass—454.0 B.t.u. per sq. ft. per day.

Then: 84.5 sq. ft. × 155.0 B.t.u./sq. ft./day = 13,020 B.t.u.'s per day (cork).

16.2 sq. ft. × 454.0 B.t.u./sq. ft./day = 7,354 B.t.u. per day (glass).

Total heat load with average service = 20,374 B.t.u.'s per day.

Table 1 shows total heat load factors for various insulation thicknesses, temperature differences, and service conditions.

Table 1

Insulation Thickness	Normal Service 50° Temp. Diff.	*Heavy Service 50° Temp. Diff.
1 in.	251.0	266.0
2 in.	191.5	205.8
3 in.	155.0	169.0
4 in.	133.2	147.0
5 in.	119.0	133.0

Insulation Thickness	Normal Service 55° Temp. Diff.	*Heavy Service 55° Temp. Diff.
1 in.	276.0	293.8
2 in.	210.5	226.0
3 in.	171.0	186.0
4 in.	146.4	161.0
5 in.	131.0	146.0

Insulation Thickness	Normal Service 35° Temp. Diff.	*Heavy Service 35° Temp. Diff.
1 in.	175.8	187.0
2 in.	134.0	144.0
3 in.	109.0	118.2
4 in.	93.1	103.0
5 in.	83.0	93.0

*Assume heavy service for all equipment located in kitchens.

All refrigerator and display case temperatures are assumed to be 40° F. Cooler temperatures are assumed to be 35° F. All room temperatures are assumed to be 90° F.

Table 2 shows total heat load factors for various glass thicknesses, temperature differences, and service conditions.

Table 2

Plates of Glass	Normal Service 50° Temp. Diff.	*Heavy Service 50° Temp. Diff.
1	1,358.0	1,451.0
2	750.0	800.0
3	454.0	485.0

Plates of Glass	Normal Service 55° Temp. Diff.	*Heavy Service 55° Temp. Diff.
1	1,490.0	1,596.0
2	825.0	879.0
3	500.0	535.0

Plates of Glass	Normal Service 35° Temp. Diff.	*Heavy Service 35° Temp. Diff.
1	945.0	1,015.0
2	525.0	564.0
3	317.0	338.0

*Assume heavy service for all equipment located in kitchens.

All refrigerator and display case temperatures are assumed to be 40° F. Cooler temperatures are assumed to be 35° F. Florist boxes are assumed to be 55° F. All room temperatures are assumed to be 90° F.

Servel Units Placed In Hawaiian Markets

HONOLULU, T. H.—Twelve installations of commercial refrigerators refrigerated with Servel commercial condensing units were recently made by Theo. H. Davies & Co., Ltd., Honolulu and Hilo, distributor in the territory of Hawaii for Servel refrigeration equipment and Friedrich fixtures.

Servel 30-F commercial machines were installed in the following: 10 ft. FA case by M. Masaki, Waimea, Kauai; 5-door P & C box by T. Hashimoto, Waimea, Kauai; 8 ft. FA case, by Honomu Store, Honomu, Hawaii.

The following installations used Servel 100-C equipment: 8x6 ft. FA cooler, Hakalau Store, Hakalau, Hawaii; 7x5 ft. FA cooler, Yet Lung Store, Lahaina, Maui; 6 ft. case, Yet Lung Store, Lahaina.

The remaining six installations used 75-C machines as follows: 7x5 ft. FA cooler, Quality Market, Honolulu, Oahu; 10 ft. FA case, Quality Market, Honolulu; 9 ft. FA vegetable case, Kemoo Farm Market, Sch. Bks., Oahu; and 5-door P & C box, Kemoo Farm Market.

In addition to the above installations the company is now installing complete market equipment for the Hilo Meat Co., the City Grocery, Len Lai Store, Nyuck's Store, and a 5-door P & C box for the CCC camp at Kokee, Kauai.

Installations of Temprite water coolers were made by the Davies Co. in the Punahou School Cafeteria, Castle Hall Dormitory for Girls, McKinley High School Cafeteria, Honolulu Iron Works Co., and Borthwick Undertaking Parlors of Honolulu.

Standard Oil Purchases Big Order of Kelvinator Beverage Cooling Units

DETROIT—Six carloads of Kelvinator beverage coolers were sold recently to the Standard Oil Co. of Indiana for installation in stations located in Indiana, Illinois, Michigan, Mississippi, and Kansas.

As an extension of Standard's service policy of giving every aid to the motorist, these coolers, equipped with water cooler and bubbler, will provide a cold drink of water to customers or give them the opportunity to buy a bottled beverage.

This large order of beverage coolers was turned in by R. J. Scheu, Chicago, of the national direct sales division of Kelvinator Corp.

Leonard Dealer Conducts 'Airways Contest'

PROVIDENCE, R. I.—An "airways contest" was the novel promotion stunt conducted recently by Ballou, Johnson & Nicholas Co., local Leonard distributor, in cooperation with other business firms and the Providence airport.

An autogiro pulled banners bearing the advertisements of the sponsors across the sky.

The banner of each sponsor was in the sky for an hour on three days during the contest.

Prizes were awarded for the nearest correct lists of banners shown during the contest, with the names of the advertisers.

A prospect list was formed from the names of contestants for dealers' use.

New 'Total Time Meter' Records Amount of Power Used

EAST PITTSBURGH—For totalizing running or idle time on electrically operated machinery including electric refrigerators, machine tools, welders, electric signs, radio transmitters, or any individual a-c powered unit, Westinghouse Electric & Mfg. Co. has just introduced the "total time meter."

The meter registers hours and it is suitable for any application where it is desirable to know the total number of hours during which a circuit is energized or apparatus is in operation.

The registering mechanism has four dials and will register 9,999 hours before repeating. If desired, the meter can be mounted on the superintendent's or foreman's office connecting it to the machine by a single pair of wires.

The total time meter including the self-starting, 120-volt, a-c, 60-cycle, synchronous motor is contained in a two-piece Moldarta case having a flange diameter of 3½ in. and overall length of about 3½ in.

The motor is of the slow-speed, sub-synchronous type, with jeweled bearings.

The total time meter can also be furnished with a special register providing one revolution per hour of the sweep hand.

The sweep hand dial is then marked in 10 main divisions each of which represents one-tenth of an hour.

TRANE PRODUCT COOLERS



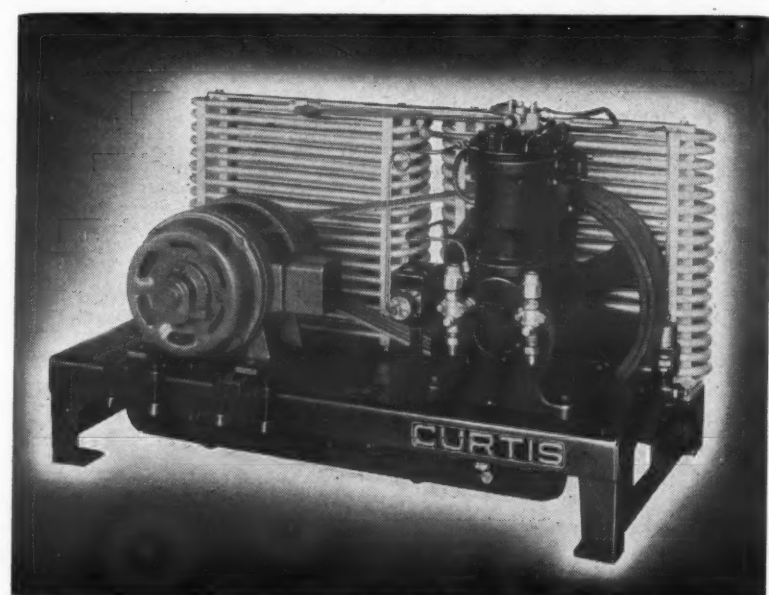
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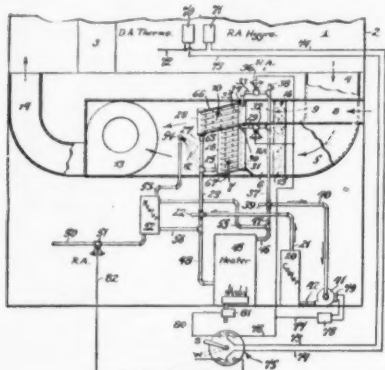
Curtis Refrigerating Machine Co.
Division of Curtis Manufacturing Co.
1912 Kienlen Ave., St. Louis, U. S. A.

PATENTS

Issued July 2, 1935

2,006,344. AIR CONDITIONING APPARATUS. Claude A. Bulkeley, New York, N. Y., assignor to Niagara Blower Co., New York, N. Y., a corporation of New York. Application Aug. 5, 1933. Serial No. 683,783. 8 Claims. (Cl. 257-8.)

1. In an apparatus for ventilating and conditioning the air in a room or the like, means for continuously withdrawing air



2,006,344

from the room to be conditioned for recirculation to said room, means for continuously withdrawing outside air, two separate cooling coils one of said coils being deeper in the direction of air flow than the other, and providing a greater resistance to the air flow, the deeper of said coils being arranged in the path of said outside air and the shallower of said coils being arranged in the path of said recirculated air, means for passing a refrigerating medium, through both of said coils at an entering temperature below the dewpoint of both of said bodies of air and countercurrent to the air flow there-through, means responsive to the dry bulb temperature in the room for controlling the velocity of said refrigerating medium in passing through both of said coils to adjust both the cooling and dehumidifying effect thereof and means for mixing the air after passing said coils.

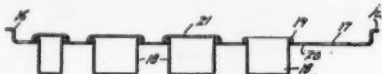
2,006,366. ROTARY COMPRESSOR. Win W. Paget, Chicago, Ill., assignor to Sullivan Machinery Corp., a corporation of Massachusetts. Application July 18, 1933. Serial No. 680,971. 23 Claims. (Cl. 230-79.)

1. In a rotary compressor or pump, a rotative idling casing containing a predetermined quantity of liquid, a driving rotor mounted eccentrically in said idling casing and comprising a series of radially extending circumferentially disposed fluid receiving pockets, said rotor in motion acting to impart rotative movement to said idling casing through the medium of said liquid and said liquid tending to assume annular mass under the action of centrifugal force with its surface relatively concentric with respect to the idling casing and eccentric with respect to the periphery of the rotor, means whereby fluid may be admitted to said rotor pockets at atmospheric pressure, and means for trapping fluid in said pockets as the latter are advanced below the surface of the liquid including a stator frame arranged within the rotor and having discharge passage means for receiving the compressed fluid from said pockets and having liquid sealing passages and supply means for the sealing liquid therefor.

2,006,442. REFRIGERATOR TRAY. William Haydn Connors, Denver, Colo. Ap-

plication Sept. 8, 1934. Serial No. 743,190. 1 Claim. (Cl. 62-169.1.)

A container shelf for refrigerators comprising: a metallic plate; upwardly extending members at the extremities of

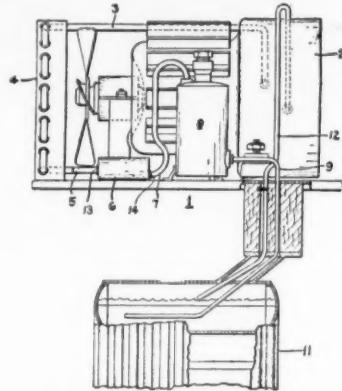


2,006,442

said plate for suspending and spacing said plate from a shelf in a refrigerator; cut outs in said plate; hydrators shaped to fit said cut outs and extend above said plate; and lids covering said hydrators and positioned between said plate and said refrigerator shelf, there being ventilating perforations formed in said plate.

2,006,478. REFRIGERATION APPARATUS. Arthur K. Phillipi, Wilbraham, Mass., assignor to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., a corporation of Pennsylvania. Application June 22, 1933. Serial No. 677,112. 3 Claims. (Cl. 62-115.)

3. In a refrigerating system, the combination of a refrigerant circulating system and a container, having a sub-

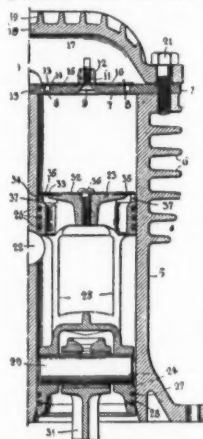


2,006,478

stantially horizontal axis, for a quantity of refrigerant connected in the system, an inlet and an outlet formed in said container, one above the other, said container being rotatably mounted for permitting rotation of said container about a horizontal axis to change the relative positions of its inlet and outlet and thereby change the effective amount of refrigerant in the system.

2,006,583. COMPRESSOR. French E. Dennison, York, Pa., assignor to York Ice Machinery Corp., York, Pa., a corporation of Delaware. Application March 19, 1934. Serial No. 716,383. 10 Claims. (Cl. 2-0-190.)

1. The combination of a compressor of the type comprising a cylinder and a reciprocating piston; and at least one un-



2,006,583

loading port of restricted size leading from a space at relatively low pressure through the peripheral walls of the piston to the area of contact between piston and cylinder.

2,006,584. COMPRESSOR. James A. De Puy, York, Pa., assignor to York Ice Machinery Corp., York, Pa., a corporation of Delaware. Application Feb. 4, 1933. Serial No. 655,242. 19 Claims. (Cl. 220-22.)

5. The combination of a compressor including a piston; means for varying the effective working stroke thereof; a movable abutment for actuating said stroke varying means; means permitting a restricted flow of pressure fluid from the discharge of said compressor to the space at one side of said abutment to develop an operating pressure against said abut-

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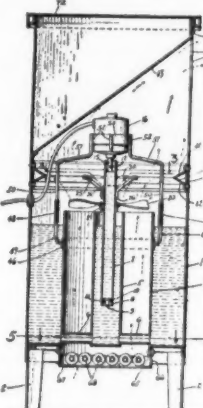
ment; valve means controlling venting of said pressure; and means responsive to a physical condition established by said compressor for actuating said valve means.

2,006,623. METHOD OF AND APPARATUS FOR MAKING ICE. Arthur M. Barrett and Louis N. Udell, Chicago, Ill. Application April 2, 1932. Serial No. 602,654. 17 Claims. (Cl. 62-105.)

1. Apparatus for making ice, comprising, in combination, a hollow body of heat conducting material, means for supplying freezing and thawing mediums to the interior of said body, and a pivoted grid adapted to swing toward and from a surface of said body, said grid having spaced members movable into parallelism with said surface and serving to divide portions of the block of ice formed on said surface lying laterally adjacent to said members.

2,006,627. HUMIDIFIER. James C. Cairncross, Minneapolis, Minn., assignor to Puffer-Hubbard Mfg. Co., Minneapolis, Minn., a corporation of Minnesota. Application July 11, 1932. Serial No. 621,947. 16 Claims. (Cl. 261-91.)

1. A reservoir having a discharge opening in its upper portion for atomized water, an air well casing leading up-

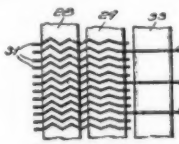


2,006,627

wardly through the bottom of the reservoir, a pump well within and spaced from the air well, means establishing a water supply connection with the pump well, a centrifugal pump including a tube rotatable in the pump well, a motor having a shaft to which the pump tube is operatively suspended, means by which the motor is detachably and operably secured within the reservoir and to the air well casing, means carried by the pump tube and arranged over the air well to create an up-draft through the air well and means adapted to receive water delivered by the pump and atomize and deliver the same across the line of draft and above and over the water of the reservoir, and baffle means detachably arranged above the motor and adapted to direct atomized products to the delivery opening of the reservoir.

2,006,649. RADIATOR CORE. Arthur B. Modine, Racine, Wis., assignor to Modine Mfg. Co., Racine, Wis., a corporation of Wisconsin. Application Dec. 15, 1930. Serial No. 502,423. 12 Claims. (Cl. 257-130.)

1. In a radiator core the combination of tubular elements providing fluid passages disposed relatively to each other

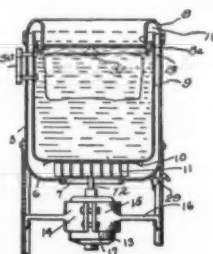


2,006,649

to allow air to circulate between said elements and fins associated with said tubes said core having a relatively greater number of fins arranged at the front than at the rear of said tubes and having a relatively greater number of tubes at the rear than at the front thereof providing means whereby a substantially equal temperature differential is maintained from the front to the rear of said core between said air and said fins.

2,006,858. PORTABLE AIR COOLING, DEHYDRATING, AND WASHING APPARATUS. Emile W. Favalora, New York, N. Y. Application Nov. 15, 1932. Serial No. 642,700. 2 Claims. (Cl. 261-121.)

1. An air conditioning portable device consisting of a vessel, a tank within the vessel and spaced apart therefrom to



2,006,858

provide an air passage between itself and the vessel, means for forcing air through the air passage, means for maintaining the tank chilled, a distributor plate located above the tank and provided with air openings and with bubble directing grooves crossing said air openings, and means for causing the air leaving said air passage to flow through the grooves.

2,006,928. HUMIDIFIER. Sidney E. Miller, Scotia, N. Y., assignor to General Electric Co., a corporation of New York. Application July 24, 1934. Serial No. 736,684. 7 Claims. (Cl. 261-106.)

1. In an air conditioning apparatus, a water drip screen unit having a strip of wire mesh folded into a superposed series of spaced apart layers for successively breaking up the water dripping therethrough into small particles and suspending globules of water at the intersections of the mesh in each layer, and supports at the ends of the layers for

SERVICE OPERATIONS

A SERIES OF LESSONS OUTLINED FOR THE USE OF THE SERVICE MANAGER IN INSTRUCTING BEGINNERS IN SERVICE WORK

No. 14—Adding Methyl Chloride (Any Make)

By K. M. Newcum

REASON:

Same as for SO₂ except that a methyl chloride job, under ordinary conditions, always works above 0 lbs. back pressure on the low side of the system, and a leak is possible on either the high or low side. Check all joints and connections as outlined in service operation 8 and make the necessary repairs. A shortage of methyl chloride will be noticed by the hissing noise at the evaporator or expansion valve, and low operating head pressure. The liquid line is usually cool or cold in most cases where there is a slight shortage. Where the shortage is great, the liquid line may become warm or hot. A shortage of methyl chloride, as with SO₂, will result in continuous operation and little or no refrigeration.

PROCEDURE:

Proceed as in service operation 13 except hold back pressure at around 10 to 15 lbs.

Check the operation with the instructor.

Note: It is some times very difficult to determine the type of refrigerant in a job, if for instance it is an old obsolete model or an orphan make. The following tests may be made to ascertain the refrigerant in question:

Sulphur dioxide is easily detected by its sulphur odor, or by subjecting the vapor or gas to ammonia fumes. A dense white smoke will arise from the chemical action of sulphur dioxide and ammonia.

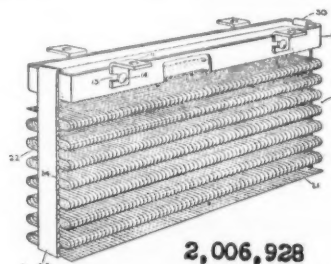
Isobutane is easily mistaken for methyl chloride but may be distinguished by the flame test as isobutane (Freezol) burns with a yellow flame, or by its operating head pressure. The operating head pressure will be around 60 lbs. in a 70° room, whereas methyl will result in an operating head pressure of around 80 to 85 lbs. or more in a 70° room. Then too, the operating back pressure of isobutane is, under ordinary conditions, below 0 lbs. back pressure, similar to SO₂ in that respect, whereas methyl will operate at a back pressure of around 10 lbs. pressure.

Methyl chloride burns with a green flame.

F-12 is odorless and will not burn. The operating back pressure of F-12 under the same conditions of methyl will be similar.

Note: In some jobs, for leak detection purposes, Acrolein (tear gas) is added to methyl chloride in concentrations up to about 1 per cent. This gives the methyl a very pungent odor, and the gas fumes will have a burning effect upon the eyes. The presence of the Acrolein does not change the operating pressures of the methyl and does not effect its performance in any way, it is merely added as a warning agent in the case of a leak.

maintaining the layers in spaced apart relation to provide for relatively unre-



2,006,928

stricted flow of air between the layers through the interconnecting portions of the mesh at the sides thereof.

2,006,988. AIR HUMIDIFYING MECHANISM FOR FURNACES. Edgar A. Francis, Marshalltown, Iowa, assignor to American Machine Products Co., Marshalltown, Iowa. Application, Sept. 2, 1931. Serial No. 560,779. 2 Claims. (Cl. 261-24.)

1. In mechanism of the character disclosed an inlet air housing, a fan casing completely housed therein and having opposed sides, each provided with an intake opening, a single blower type fan in said fan casing receiving air from both of said intake openings and means for spraying water into said housing between the walls thereof and each of said intake openings of said fan casing whereby such water humidifies the air entering said housing before it enters said casing and the air entering each intake opening of said fan casing flows through said sprayed water.

2,006,992. REFRIGERATING APPARATUS. Frank T. Grothouse, Fort Wayne, Ind., assignor to General Electric Co., a corporation of New York. Application April 6, 1934. Serial No. 719,355. 8 Claims. (Cl. 62-116.)

1. A refrigerating apparatus comprising a closed casing, means including a plate arranged within said casing and spaced therefrom for defining an air passage between said plate and said casing, a motor element and a compressor element driven thereby arranged on opposite sides of said plate, one of said elements being supported by said plate, means including a fan for circulating air around said plate and over said motor and said compressor, and means including a heat exchange device arranged in the path of air circulating over said motor and said compressor for cooling the circulated air.

2,007,001. EXTENDED SURFACE CONVECTOR. William E. Oakey, Oriskany, N. Y. Application March 2, 1934. Serial No. 713,743. 4 Claims. (Cl. 257-124.)

3. An extended surface convector comprising, in combination, a fluid conducting ferrous metal tube, a plurality of

ferrous sheet metal fins of small area mounted on said tube, flanges along two opposed edges of each of said fins adapted to engage an adjoining fin, brazed joints between said fins and said tube and between said flanges and the adjoining fins, whereby the tube and the fins are joined into a unitary rigid structure with two closed sides, and a brazed coating integral with said brazed joints and forming a substantially continuous heat conducting surface over said tube and fins.

2,007,048. FLOAT VALVE. John F. Goodwin, Sarnia, Ontario, Canada, assignor of one-fourth to Harold R. Goodwin, Detroit, Mich. Application Feb. 20, 1933. Serial No. 657,539. 4 Claims. (Cl. 137-104.)

1. In a valve the combination of a chamber; a flexible diaphragm dividing the chamber into two compartments, the first provided with a water inlet and with an outlet controlled by the diaphragm; a hollow closed rubber cushion connected with the diaphragm within the second compartment and opposite the outlet; a restricted by-pass forming a communication between the compartments; and means controllable by a float valve for venting the second compartment.

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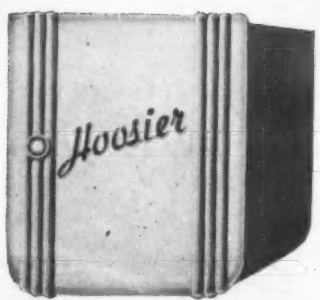
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SERVICE

Use of the Automatic Expansion Valve

Editor's Note: Mr. Newcum's articles constitute a manual of information on present-day refrigeration systems which will add to the service man's knowledge of refrigeration, and which will assist him in meeting specific problems in servicing operations in the field.

The article in this issue is a continuation of the discussion which began in last week's issue on the design and operation of various types of automatic expansion valves.

Following is an outline of Mr. Newcum's articles as they have appeared in the News.

April 10 Issue

Chapter 1—THEORY OF REFRIGERATION
This chapter deals with fundamentals of refrigeration. Inasmuch as refrigeration is really a process of the removal of heat from a given space, "these" fundamentals consists mainly of the terms, definitions, and physical laws which are involved when heat is transferred from one substance or space to another location.

April 17 Issue

Chapter 2—PRINCIPLES OF MECHANICAL REFRIGERATION
Three principal parts of the household refrigeration system—cabinet, condensing unit, and evaporator—are described briefly in this chapter, and

Design and functions of the following compressor parts are described: compressor body assembly, housing assembly, crankshaft and connecting rod assembly, eccentric shaft and connecting rod assembly, piston and piston valve assembly, and discharge valve assemblies. Service operations on these various compressor parts are outlined.

May 8 Issue

Chapter 4—CONDENSING UNITS
(Installment 2: stuffing box seals, flywheel, and direct-connected condensing units.)

Different designs of stuffing box seals, operating principles of these seals, and methods of servicing them are explained and illustrated. Flywheels and direct-connected condensing units are also discussed.

May 29 Issue

Chapter 4—CONDENSING UNITS
(Installment 3: rotary compressors.)
Rotary compressor design, operation, and servicing are described, with Norge and Majestic makes discussed in some detail.

June 5 Issue

Chapter 4—CONDENSING UNITS
(Installment 4: care and servicing of shut-off valves and gaskets.)

Detroit Lubricator Valve

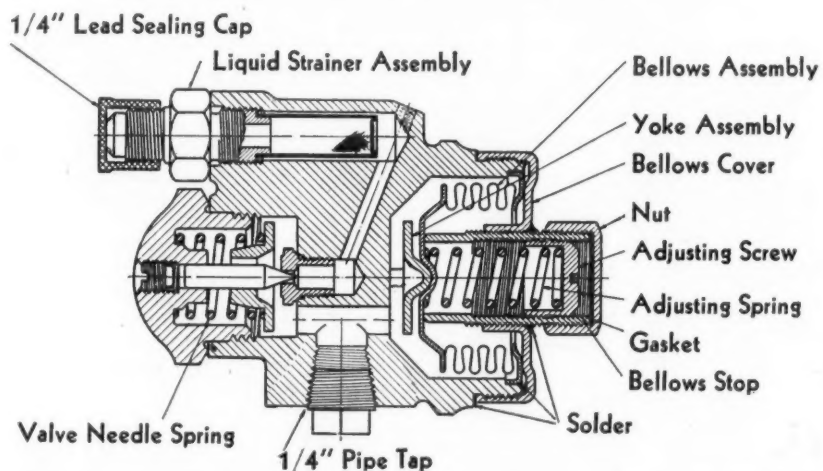


Fig. 103. Detroit Lubricator automatic expansion valve employing the flexible metal bellows. (A) moisture-tight packing around adjusting screw; (B) adjusting screw; (C) adjusting spring; (D) bellows; (E) joint; (F) strainer; (G) copper gasket; (H) inlet connection 1/4-inch copper tube; (J) needle swivel; (K) plug hermetically sealed with solder; (L) needle; (M) seat; (N) outlet connection.

the operating cycle of a refrigerator is explained in detail. Also published with this chapter is the refrigerant pressure-temperature chart and an explanation of service gauges.

April 24 Issue

Chapter 3—COMMON REFRIGERANTS
Properties which are necessary for a good refrigerant are outlined in this chapter, which also gives a detailed comparison of the physical properties and characteristics of the following refrigerants: sulphur dioxide, methyl chloride, ethyl chloride, ammonia, and Freon.

May 1 Issue

Chapter 4—CONDENSING UNITS
(Installment 1: description of various compressor parts.)

Operation and servicing of the various shut-off valves are outlined in this article, and suggestions given on the care of gaskets.

June 12 Issue

Chapter 4—CONDENSING UNITS
(Installment 5: condensers.)
Various types of condenser design are described and illustrated, and suggestions made for their care and servicing.

June 19 Issue

Chapter 4—CONDENSING UNITS
(Installment 6: liquid receivers.)
Described in this installment are liquid receivers used with air-cooled condensers. Horizontal and vertical receivers for flooded and dry systems are explained.

Fedders Automatic Expansion Valve

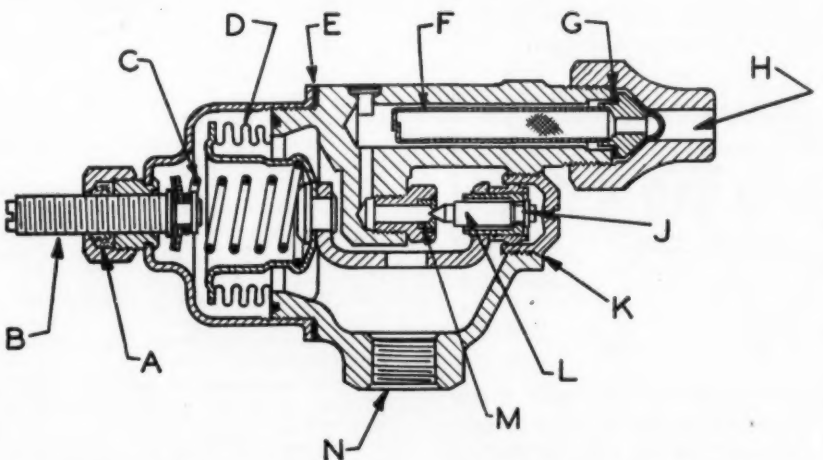


Fig. 104. Fedders automatic expansion valve, with various parts enumerated by means of arrow-head lines.

June 26 Issue

Chapter 5—EVAPORATORS
(Installment 1: flooded evaporators with low side float valve.)

This article explains the operation of the flooded system with the low side float valve and gives information on service problems that are likely to be met.

July 3 Issue

Chapter 5—EVAPORATORS
(Installment 2: high side float valves and flooded evaporators.)

Different types of high side float valves and their use in flooded systems are discussed and illustrated in this issue. The article also explains service problems which may be encountered and deals with the liquid temperature valve.

July 10 Issue

Chapter 5—EVAPORATORS
(Installment 3: automatic expansion valves.)

Design and operation of automatic expansion valves, covering particularly the Frigidaire and Kelvinator types.

66. Automatic Expansion Valves (Continued)

A Detroit Lubricator automatic expansion valve is shown in Fig. 103. This valve employs the flexible metal bellows to accomplish the necessary travel at the needle.

The liquid refrigerant enters through the screen strainer F up to the seat M and needle L.

As the pressure in the evaporator and expansion valve is reduced by the compressor, the atmospheric pressure in the area housing the adjusting spring C remains constant, tending to compress the bellows, which by its connection with the yoke and needle, forces the needle away from the seat, admitting refrigerant through this opening.

The resulting increase in pressure in the valve body responds on the bellows, causing it to elongate, moving the needle and yoke assembly and drawing the needle back to the seat, to close the valve.

As is the case with most expansion valves the back pressure may be increased by turning the adjusting screw to the right or clockwise.

The Fedders automatic expansion valve is shown in Fig. 104. Kelvinator bellows type valve is shown in Fig. 105. Note the difference in design and construction of the several valves of different manufacture. The function and purpose of the several types is the same, although the mechanical principles may be somewhat different.

The operating back pressure in the low side of a system using the automatic expansion valve remains constant during the entire cycle, that is, if the valve is adjusted to operate at a certain pressure, for example 6 in. of vacuum which is a common setting when used with SO₂, the pressure on the low side will remain at 6 in. of vacuum so long as the system is in normal operation and the valve is mechanically correct.

The pressure does not increase with an increase in evaporator temperature nor decrease with a decrease in evaporator temperature, as it does with the flooded system. This fact precludes the possibility of employing the low pressure control in a system using the automatic expansion valve as a refrigerant control.

Inasmuch as the operation of the valve is controlled by the pressure within the low side of the system, it is impractical to use automatic expansion valves in multiple. The automatic expansion valve is used in single evaporator systems, in conjunction with the thermostatic temperature control.

During the off cycle, that is, when the compressor is idle, the saturated vapor which was present in the evaporator at the close of the cycle, will expand, and the pressure in the evaporator and the entire low side will increase, in proportion to the increase in temperature.

This increased pressure will tend to hold the valve closed more tightly during the off cycle. When the temperature of the evaporator and the refrigerator has risen sufficiently to effect the thermostatic control, and the compressor starts the on cycle, this increased pressure is drawn to the compressor, reducing the pressure in the low side to the set operating pressure of the expansion valve, at which point the valve opens and starts its regular operation at a continuous set back pressure.

The most common cause of expansion valve troubles is through dirt, scale, or some foreign particle lodging between the needle and seat, holding the valve in the open position.

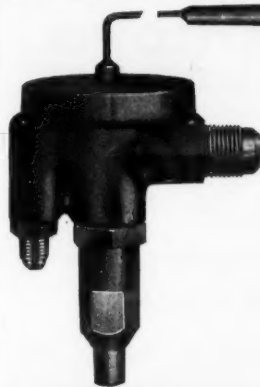
This will cause the back pressure to remain higher than normal during the regular on cycle, and may allow the evaporator to become flooded with refrigerant on the off cycle, as the seal between the high and low pressure sides is broken.

Either of these two conditions will give the same result as an expansion valve that is opened too much, or set for too high an operating back pressure.

(Concluded on Page 18, Column 3)

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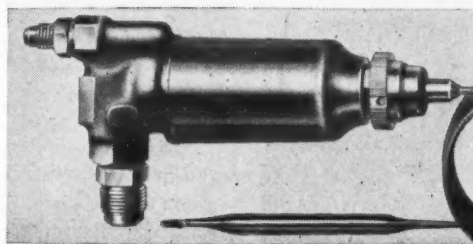
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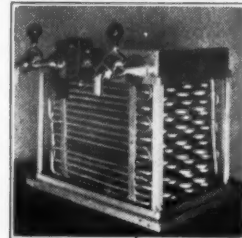
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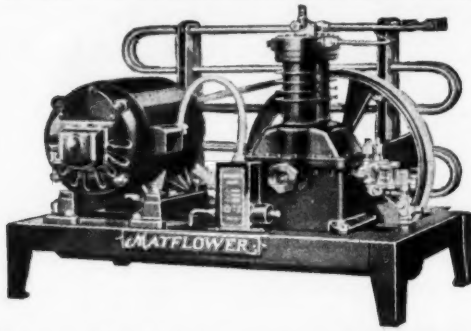
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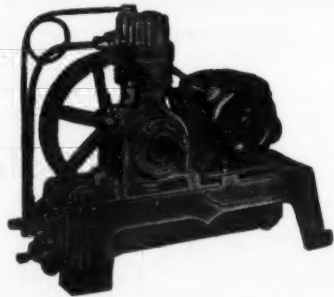
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Use of Automatic Expansion Valves

(Concluded from Page 17, Column 3)
pressure, and may result in a frosted
or sweating suction line.

The expansion valve may be flushed
the same as a low side float by closing
the liquid line shut-off service
valve at the receiver, and allowing
the compressor to operate drawing a
20-in. vacuum on the low side of the
system.

With this low pressure on the low
side the valve will be in the full open
position, and by opening the liquid
service valve as rapidly as possible,
the sudden inflow of liquid refrigerant
past the needle and seat may dislodge
the particle.

Flush Leaky Valve

The service man should always
flush the leaky expansion valve be-
fore changing the adjustment. If
flushing corrects the condition, the
valve should return to normal opera-
tion.

In such cases where the cause is
directly traceable to foreign matter
under the needle and seat, it may be
considered that the strainer in the
expansion valve or line is inadequate,
and this condition may be corrected
by installing a more efficient filter in
the liquid line at the most convenient
location.

Excessive operating head pressure
will materially effect the life of the
expansion valve. Where the operat-
ing head pressure is excessive, due to
an overcharge or air in the system,
the compressed vapors are not com-
pletely condensed, and allowed to
cool to normal temperatures, and are
thus supplied to the expansion valve
as hot, high velocity, partially con-
densed gas, resulting in excessive
wear at the needle and seat.

Carbonizes Lubricating Oil

A system that has been operating
at high head pressures for any length
of time may tend to carbonize a part
of the lubricating oil in the system.
These small particles of carbon are
carried with the liquid refrigerant,
and tend to cause excessive wear at
the needle and seat, as they are being
sprayed through the orifice and
come in contact with the needle.

A highly efficient filter should be
used to remove as much of this free
carbon as possible, and the cause of
the excessive head pressure should be
corrected.

Metals used in expansion valve
needles and seats are selected for
their wearing qualities and resistance
to erosion or corrosion. The common
refrigerants in their normal dry
state will not affect these metals.

Moisture admitted to the system
may change the chemical properties
of the refrigerants sufficiently to at-
tack these metals causing them to
become pitted or scored. Moisture
and its effect upon the several refrigerants
has been discussed.

A system that is operating short of
oil will not be circulating a sufficiently
great amount of oil with the liquid
refrigerant to properly lubricate the
expansion valve. This lack of lubri-
cation at the needle and seat mate-
rially affects the seal, and also
results in excessive wear and frequent
service difficulties with the expansion
valve.

Differ with Refrigerants

Due to the density, latent heat, and
other physical properties of the sev-
eral common refrigerants, the manu-
facturers usually supply a separate
expansion valve for each different
refrigerant. The refrigerant should
be specified when ordering an expan-
sion valve.

INSTALLATION OPERATIONS

A SERIES OF LESSONS OUTLINED FOR THE USE OF THE SERVICE MANAGER
IN INSTRUCTING BEGINNERS IN INSTALLATION WORK

No. 14—Drilling Tubing Hole in a Porcelain Refrigerator

By K. M. Newcum

TOOLS NEEDED:

Carpenter's brace, 1/4-inch steel bit, tapered pipe reamer, bit extension,
center punch, rule, breast drill, 1-inch wood bit, 1-inch steel bit, and
cold chisel.

PROCEDURE:

1. Determine where the hole is to be drilled for the lines to come
into the refrigerator. Mark where the hole is to be made on the
inside of the ice compartment.
2. Make a corresponding mark on the back of the refrigerator.
3. Center punch the sheet metal covering the back of the refrigerator,
in center of mark.
4. Cut metal, with cold chisel, to an opening of 2 inches in diameter.
5. Insert 1/4-inch steel bit in breast drill and drill through wood,
insulation, and porcelain lining of refrigerator.
6. Check to see that hole came out where intended.
7. Install pipe reamer in bit extension and brace and insert end
of reamer in 1/4-inch hole from the inside of the ice compartment.
8. Ream the porcelain lining with the reamer until a 1-inch hole
has been effected. Do not attempt to ream too fast or the
porcelain will be chipped by the cutting action of the reamer.
9. Remove reamer from bit extension and install 1-inch steel bit.
Insert bit through the 1-inch hole in the porcelain lining and drill
through to the outside box, completing a full 1-inch hole through
the entire back wall of the ice box.
10. Check with instructor.

Note: A 1-inch hole is large enough to accommodate one 1/2-inch and
one 1/4-inch tube, and an electric line for the thermostatic control, if
the latter is used.

Purpose of the expansion valve—to
regulate the amount of refrigerant
admitted to the evaporator—should
not be misconstrued. Although the
adjustment of the valve has some
effect upon the temperature of the
refrigerator, the control of tempera-
ture should be governed by the ther-
mostatic control, and not by the
expansion valve.

Evaporator Should Frost

Most evaporators are so designed
that to obtain full efficiency, the
entire evaporator should frost, that
is, the refrigerant supply should be
so regulated that all of the coil re-
ceives saturated vapor. As this supply
is regulated by the expansion valve,
the first principle in determining the
proper adjustment is to operate the
system with the expansion valve
adjustment as near normal as is
possible, until the desired evaporator
and refrigerator temperature is ob-
tained. At this point the frost line
should be checked.

If the evaporator is not completely
frosting the adjustment should be
changed sufficiently to permit the
entire evaporator to frost up to the
point where the suction line is con-
nected to the evaporator, but not out
of the refrigerator.

The thermostatic control should
then be adjusted to stop the com-
pressor at this point, or at the desired
temperature. The system should be
allowed to operate through several
cycles, and the frost line at the end
of each cycle should be checked, as
well as the evaporator and refriger-
ator temperature. The operating back
pressure should be noted for future
reference.

Diesel School Offers Refrigeration Course

SAN FRANCISCO—United Engi-
neering Schools, with headquarters
here, are now offering a home train-
ing course on air conditioning, de-
clares L. R. Moran, auditor for the
schools.

United Engineering Schools have
previously offered courses in home
training chiefly on Diesel power en-
gineering.

E. W. Berry is educational director,
and Arthur H. Lacey is technical
director.

Chapter 1 of the course, which
deals with the scientific theory be-
hind air conditioning, indicates that
considerable emphasis will be placed
on the cooling phase of air condi-
tioning.

The theory of refrigeration, meth-
ods of heat transfer, pressure tem-
perature relationships, and the re-
frigeration cycle are discussed, with
a number of illustrations, in some
detail.

Students are given a set of "true
or false" examination questions at
the end of each chapter. These ques-
tions for the student to answer "true" or
"false" as published at the end of the
first lesson are as follows:

1. An air conditioning engineer does
not require a knowledge of refrigera-
tion.
2. Air conditioning work requires a
knowledge of several trades.
3. Air conditioning has opened a
new and profitable field to the refrig-
eration industry.
4. A block of ice requires from 30
to 60 hours to freeze, in an ice plant.
5. Heat may be transferred by radi-
ation or conduction.
6. The boiling point of a substance
is dependent upon its pressure.
7. The volume of a gas is not af-
fected by the pressure exerted upon
it.
8. The major parts of the elemen-
tary refrigerator are: evaporator,
compressor, condenser, liquid receiver,
and expansion valve.
9. A compression system may be
divided into two parts: the high and
low sides.
10. The refrigerant in the elemen-
tary refrigerators goes through a
series of changes and returns to its
original condition.

Kelvinator Bellows-Type Valve

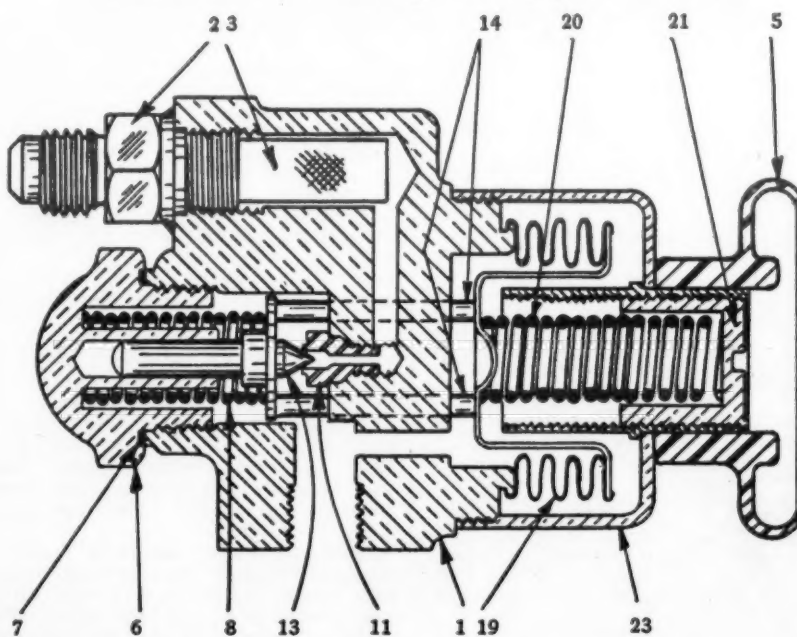


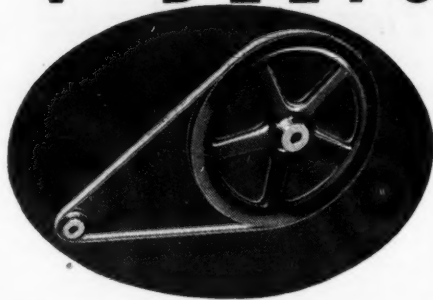
Fig. 105. Kelvinator bellows-type valve. (1) body; (2) inlet fitting;
(3) strainer; (5) bellows case cap; (6) valve spring plug; (7) valve
spring plug gasket; (8) valve spring; (11) valve seat; (13) valve;
(14) operating pin; (19) bellows; (20) adjusting spring; (21) adjusting
screw; (23) bellows case.

DAYTON V-BELTS

There is a Dayton V-Belt made especially for all makes and types of refrigerators, washing machines and other appliances. A stock is available near you. Send for price list and name of your nearest distributor.

THE DAYTON RUBBER MFG. CO.
DAYTON, OHIO

The world's largest manufacturer of V-Belts



QUESTIONS

Sales Figures by Years

No. 2345 (Manufacturer, Missouri)—“We would like to secure information showing:

“1. The number and value in dollars of household refrigerators sold by years since 1920.

“2. The number and value in dollars of commercial and industrial refrigerators sold by years since 1920.

“We will also indeed appreciate it if you will give us the source of the data from which the figures are tabulated.

“It is quite likely that you may have published these statistics in some of your recent issues and if so will appreciate your referring us to the issue in which the data is published.

“If you cannot give us the data requested above we will appreciate your giving us such data as you have along the lines we have requested.”

Answer: Sales of household electric refrigerators by years since 1920 were published on page 13 of the February 20 issue of the ELECTRIC REFRIGERATION NEWS. These figures were obtained by information received from the Refrigeration Division of the National Electrical Manufacturers Association added to estimates obtained for sales by non-Nema companies.

We have estimated sales of commercial refrigerating machines since 1923 to be as follows: 1923, 1,700; 1924, 9,500; 1925, 37,500; 1926, 75,000; 1927, 125,000; 1928, 167,500; 1929, 186,800; 1930, 128,800; 1931, 140,600; 1932, 83,100; 1933, 87,000; 1934, 116,400.

These figures were obtained by combining Nema sales records with those furnished by the Refrigeration Machinery Association and adding estimates for the small unreported volume.

Sales of industrial refrigerating machines in the United States since 1900 may be found on pages 20 and 21 of the 1935 REFRIGERATION AND AIR CONDITIONING MARKET DATA BOOK. Estimates for 1933 and 1934 were as follows:

	1933	1934
Total number of machines sold	7,900	9,600
Total tonnage	54,000	57,000
Average tonnage	6.9	5.9

All these figures together with all other available statistical information covering the refrigeration and air-conditioning industry are now available in the 1935 REFRIGERATION AND AIR CONDITIONING MARKET DATA BOOK.

'Glacier' Refrigerator

No. 2346 (Dealer, Tennessee)—“Can you inform us where the Glacier electric refrigerators and radios are manufactured? If you will send us the address we will greatly appreciate it.”

Answer: If any reader has information on these products, the editors will appreciate receiving it.

Names of Manufacturers

No. 2347 (Manufacturer, Ohio)—“I am not quite sure, but believe that you publish during the year an issue which incorporates all the names and addresses of refrigerator manufacturers and would appreciate it if you could send me a copy of this issue. I would like to hear from you whether or not an issue of this kind is published.”

Answer: A complete list of manufacturers of household electric refrigerators is published on pages 235, 248, and 249 of the 1935 REFRIGERATION AND AIR CONDITIONING DIRECTORY. Names of some of the principal manufacturers might be obtained from the specifications of household electric refrigerators given in the June 12 issue of ELECTRIC REFRIGERATION NEWS.

Operating Cost Data

No. 2348 (Utility, Alabama)—“We are trying to obtain data on the monthly cost of household refrigeration throughout the year. Our records show only the average cost, and not the minimum and maximum costs of the hot and cold seasons. If you have any such data on either the electrical or gas refrigerators that you could supply us with, or give us references on such, we would appreciate it very much.”

Answer: Very few impartial studies of the cost of operating household electric refrigerators have been made. However, one such study prepared for the *Journal of Home Economics* was published on page 7 of the December 20, 1933, issue of the NEWS.

Saturation by Areas

No. 2349 (Advertising Agency, Illinois)—“What is the approximate electric refrigeration saturation in metropolitan cities against rural areas?”

Answer: No record of electric refrigeration saturation is available other than that for the United States as a whole. Wired homes saturation as of January 1, 1935, was estimated at 28.2 per cent. Our guess is that rural saturation is considerably lower than metropolitan.

Sarco Valve

No. 2350 (Dealer, Iowa)—“Can you give us the address of the company making what is known as the Sarco mixing valve?”

“This is a valve to be used in connection with air conditioning and is of the three-way electric control type to be used in the brine pipe line.”

Answer: Sarco Co., Inc., 42 E. 34th St., New York City.

Counter Freezer Maker

No. 2351 (Special Representative, New York)—“Kindly give me the name and address of manufacturers of ice cream freezing counters and dispensing counters. I think there are two concerns in Chicago who make them, the Tuthill Mfg. Co., and the Geberhardt Mfg. Co.”

Answer: Manufacturers of counter type ice cream freezers are listed on page 203 of the 1935 REFRIGERATION AND AIR CONDITIONING DIRECTORY.

Capewell's Location

No. 2352 (Dealer, Mississippi)—“We are wondering whether or not you can give us the address of E. R. Capewell, Philadelphia, Penna., who manufactures Frigidair parts.”

“The parts are sold under the name of the above individual but we have never been able to locate the name of the company or street address.”

Answer: 231 N. Second St., Philadelphia, Pa.

Makers of Grilles

No. 2353 (Manufacturer's Representative, Texas)—“Will you kindly advise me of the name and address of the leading manufacturers of grilles. I am particularly interested in securing the name and address of the company in Cleveland that manufactures grilles.”

Answer: Manufacturers of air conditioning grilles are listed on page 162 of the 1935 REFRIGERATION AND AIR CONDITIONING DIRECTORY.

Freezing Unit for Eggs

No. 2354 (Exporter, Michigan)—“I have had an inquiry from the continent from one of our distributors for a cabinet and freezing unit that is used for freezing the yellow and white of eggs separately.

“According to the information which I have this is an American unit and I would request that you forward whatever information you have on this particular unit to me as the inquirer feels that he can do quite good business with a unit of this type.”

First Bancredit Corp.

No. 2355 (Wholesaler, West Virginia)—“In your June 26 issue you gave considerable space to the ‘Time Sales Plan’ of the First Bancredit Corp. We are interested in their proposition and wrote them at New York City; the letter, however, being returned to us for more complete address.

“We will appreciate your advising us where we can communicate with this company.”

Answer: See below.

No. 2356 (Distributor, Florida)—“Will you please advise us by return mail the address of the home office of the First Bancredit Corp. Your issue of the 26 of June had an article concerning this company and we are anxious to obtain more information about their plan.”

Answer: See below.

No. 2357 (Manufacturer, Alabama)—“Your news item about the First Bancredit Corp. interests us. Please advise their nearest address.”

Answer: See below.

No. 2358 (Utility, New York)—“On the front page of the June 26 issue of ELECTRIC REFRIGERATION NEWS there is an article entitled ‘Bancredit Plan Lowers Charges on Time Sales,’ and in it you refer to the First Bancredit Corp., a new finance concern in co-operation with the Federal Housing Administration.

“We are anxious to know something about this organization, and would appreciate it if you could give us its location and any other information which you may have available.

“If you do not have such information, will you kindly tell us where we may obtain same.”

Answer: Executive offices of First Bancredit Corp. are located in the First National Bank Building, St. Paul, Minn., with L. M. Lilly, president of the firm in charge.

Main office in the east is at Essex Building, Newark, N. J., under the direction of C. A. Gunderson, vice president.

Branch offices are located in the following 10 cities: 10 Pryor Street Building, Atlanta, Ga.; 89 Broad St., Boston; Smith-Austermuhl Building, Camden, N. J.; Insurance Exchange Building, Chicago; First National Bank Building, Dallas, Tex.; and Penobscot Building, Detroit.

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REBUILT Mayson expansion valves, \$1.00. Rebuilt American Radiator expansion valves, \$1.65. Ranco controls, all types, \$1.95. Frigidaire and Kelvinator dry and flooded coils, \$1.50 up. Rebuilt domestic and commercial units, \$12.50 up; all sizes from 1/2 HP to 1 1/2 HP; thoroughly rebuilt, fully reconditioned. Federal Refrigerator Corp., 437 11th Ave., New York.

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